ISTANBUL TECHNICAL UNIVERSITY ★ GRADUATE SCHOOL

WALL: ITS TECTONIC EVOLUTION AND STEREOTOMIC RE-INTERPRETATION

Ph.D. THESIS

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Department of Architecture

Architectural Design Programme

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DUVAR: TEKTONİK GELİŞİMİ VE STEREOTOMİK YENİDEN YORUMU

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To my family,

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WALL: ITS TECTONIC EVOLUTION AND STEREOTOMIC RE-INTERPRETATION

SUMMARY

In this study, the tectonic evolution of the wall, one of the fundamental architectural elements, was examined throughout the historical process. Subsequently, it has been shown that it gradually lost its ontological features, especially under the influence of Modern Architecture. Finally, it has been revealed that the re-interpretation of stereotomy can create an opportunity in overcoming this "crisis" situation in which the wall has entered.

When it comes to a thesis that deals with the wall, which can also be considered as a border or boundary, it may come to mind that the discussion is carried out on a political level. However, here, the scope of the thesis has been consciously limited, and care has been taken to look at the wall in the context of tectonic theory. For this reason, and to understand the terminology used, the theoretical framework is first introduced.

The section where the theoretical framework is discussed, is structured as consisting of three subheadings. In the first of these, an attempt was made to define the wall as used in this thesis and to explain two concepts that will be used extensively in the study; firstly, the concept of "tectonics" and then "stereotomy" are defined using their lexical meanings, etymological roots and usage in the literature. Attention was drawn to the difference between tectonics and tectonic. It has been emphasized that when the word is used as a noun, it refers to the architectural tectonic theory, and when it is used as an adjective, it refers to the tectonic construction system consisting of the combination of linear elements. Stereotomic, as a construction system based on the principle of cutting solid objects, is positioned opposite tectonics. Following this, stereotomic features are listed.

Following the definitions part, a literature review was conducted, and in this context, the texts of Karl Bötticher and Gottfried Semper, who can be described as the pioneers of the theory of architectural tectonics, were examined. The similarities and differences in the conceptual approaches of two German architects and theorists are revealed, and the theory of architectural tectonics is discussed in various aspects through the lens of the fundamental texts they wrote. The ontology - representation duality in Bötticher's approach is emphasized, and it has been demonstrated that tectonics can work like a bridge, bringing these two extremes together. It is explained that in Semper, this duality is not as dominant as in Bötticher, with reference to his mask (*Bekleidung*) theory. On the other hand, attention was drawn to Semper's emphasis on the authenticity of the essence under the mask. In addition, Semper’s four elements of architecture were mentioned and it was revealed that these elements can be considered in the context of the tectonic - stereotomic duality.

Following the fundamental texts of Bötticher and Semper, studies that can be examined in the context of architectural tectonic theory and that can clarify the way in which the said theory and the notion of tectonics are introduced in the thesis, that belong to various architects and theorists, including Kenneth Frampton, Gevork Hartoonian, Demetri Porphyrios, Dalibor Vesely and Martin Heidegger, have been examined. The complexity in the use of the notion of tectonics, which is also expressed in the definitions section, has been resolved through both Frampton's uses of the term and its difference from the notion of technology.

In the continuation of this part, the current situation of the wall is examined, in the context of the theory of architectural tectonics. The articles of Bernhard Siegert and Adrian Forty are important as they reveal that the architectural component in question is facing extinction as the need for walls disappears. Roger Riewe is another name referred to at this stage, with his article in which he explains that two methods, which can be expressed as layering and folding, offer different alternatives in the use of walls in contemporary architecture. The operability of the two methods in question has been evaluated through the works of different architects and theorists, including Georges Teyssot, Greg Lynn, Anthony Vidler, Michael Speaks and Hal Foster.

Discussions in the context of the theory of architectural tectonics have been expanded through studies showing that the stereotomic construction system has an increasing place in current architectural theory and practice. The reasons for this trend, which can also be described as a kind of paradigm change, have been explained through the works of Stan Allen, Kenneth Frampton and Hashim Sarkis. Stereotomic construction has been described as a third method in terms of wall recovery, in addition to layering and folding. Moreover, the differences of stereotomic construction from the other two methods are revealed and its advantages over them are underlined. At this point, Gevork Hartoonian's article, in which he touches upon the works he calls New Brutalism, has served as a kind of bridge between the previous texts and the texts of names such as Giuseppe Fallacara, Francesco Defilippis and Brandon Clifford, who read the return of stereotomy through the opportunities offered by digitalization.

After establishing the theoretical framework, the theoretical model was presented. For this purpose, the concept pairs derived from the texts of Karl Bötticher and Gottfried Semper in the literature review, that is, ontology - representation and tectonic - stereotomic, were brought together on a theoretical coordinate system diagram, creating an analysis surface on which individual wall examples can be examined comparatively. However, before proceeding here, historical fragments in which the tectonic behavior of the wall varies have been selected. The diversity of tectonic behavior in the fragments in question was examined through the ontological qualities of the wall, namely load-bearing and permeability. Subsequently, the findings regarding the tectonic behavior of each wall sample are expressed on the mentioned coordinate system diagram.

Based on these findings, it is concluded that the wall, one of the fundamental components of architecture, has become increasingly tectonic, especially under the influence of Modern Architecture. As a result, it has been revealed that the balance between stereotomic and tectonic behavior, as well as between its ontological essence and representational character, is gradually lost. The wall is at risk of turning into a surface devoid of its ontological qualities, remaining only in its capacity to represent, to sign.

In this context, it has been concluded that a stereotomic return, re-interpreted, hybridized with tectonics when necessary, produced with materials other than conventional materials, and fed by geologization and digitalization, can be considered as a design approach in overcoming the ontological crisis of the wall. Stereotomy offers a way to eliminate the disconnection between ontological essence and representational character of this element, thanks to the direct transfer it establishes through decoration, especially between its load-bearing capacity and its representative attribute. The wall, which is becoming increasingly tectonic, and commodified, is on the verge of extinction, as stated before. However, it can be reintroduced into the repertoire of contemporary architectural practice as an important architectural component, thanks to the stereotomic construction system.

DUVAR: TEKTONİK GELİŞİMİ VE STEREOTOMİK YENİDEN YORUMU

ÖZET

Bu çalışmada, temel mimari bileşenlerden olan duvarın, tarihsel süreç boyunca tektonik gelişimine bakılmış; akabinde, özellikle de Modern Mimarlık'ın etkisi altında, ontolojik özelliklerini giderek kaybettiği gösterilmiş; son olarak da, stereotominin yeniden yorumlanmasının, duvarın içine girdiği bu "kriz" durumunun aşılması bakımından bir açılım yaratabileceği ortaya konulmuştur.

Bir sınır veya kenar olarak da düşünülebilecek duvarın ele alındığı bir tez çalışması denilince, akla politik düzlemde bir tartışma yürütülebileceği gelebilir. Ancak burada, tezin kapsamı bilinçli bir şekilde sınırlandırılmış, duvara tektonik kuramı bağlamında bakılmasına dikkat edilmiştir. Gerek bu nedenle, gerekse de kullanılan terminolojinin anlaşılabilmesi bakımından, ilk olarak kuramsal çerçeve ortaya konulmuştur.

Kuramsal çerçevenin ele alındığı bölüm, kendi içinde üç alt başlıktan oluşacak şekilde kurgulanmıştır. Bunlardan ilkinde duvarı bu tezde kullanıldığı şekliyle tanımlamaya ve çalışmada yoğun olarak kullanılacak iki kavramın açıklanmasına çalışılmış; öncelikle "tektonik", ardından da "stereotomi" kavramları, sözlük anlamları, etimolojik kökenleri ve literatürdeki kullanımlarından faydalanılarak tanımlanmıştır. Tektoniğin İngilizce karşılığı olarak kullanılan *tectonics* ve *tectonic* farkına dikkat çekilmiş; kelimenin isim olarak kullanımında mimari tektonik kuramının kastedildiği, sıfat olarak kullanımında ise çizgisel elemanların birleşiminden oluşan tektonik yapım sistemine atıfta bulunulduğu vurgulanmıştır. Katı cisimlerin kesilmesi prensibine dayanan bir yapım sistemi olarak stereotomi, tektoniğin karşısında konumlandırılmış, stereotomik özellikler sıralanmıştır.

Tanımların ardından literatür taramasına geçilmiş, bu kapsamda da öncelikle mimari tektonik kuramının öncülleri olarak nitelendirilebilecek Karl Bötticher ile Gottfried Semper'in metinleri incelenmiştir. İki Alman mimar ve kuramcının kavrama yaklaşımlarındaki benzerlik ve farklılıklar ortaya konulmuş, yazmış oldukları temel metinler üzerinden mimari tektonik kuramı çeşitli veçheleriyle ele alınmıştır. Bu bağlamda, Bötticher'in yaklaşımındaki ontoloji - temsil ikiliği vurgulanmış; tektoniğin söz konusu iki ucu bir araya getiren bir köprü gibi çalışabileceği ortaya konulmuştur. Semper'de bu ikiliğin Bötticher'deki kadar baskın olmadığı, maske (Alm. *Bekleidung*) kuramına atıfla anlatılmış; buna karşın, Semper'in maskenin altındaki özün hakikiliğine yaptığı vurguya dikkat çekilmiştir. Buna ek olarak, mimarlığın dört öğesi olarak ortaya koyduğu unsUrlara değinilmiş, söz konusu unsUrların tektonik - stereotomik ikiliği bağlamında düşünülebileceği ortaya konmuştur.

Bötticher ve Semper'in temel metinlerinin ardından, aralarında Kenneth Frampton, Gevork Hartoonian, Demetri Porphyrios, Dalibor Vesely ve Martin Heidegger'in de olduğu çeşitli mimar ve kuramcıların, mimari tektonik kuramı bağlamında incelenebilecek, söz konusu kuramın ve yine tektonik kavramının tezdeki ele alınış biçimini netleştirebilecek mahiyetteki çalışmaları incelenmiştir. Tektonik kavramının kullanımındaki, Tanımlar kısmında da ifade edilmiş olan karmaşıklık, gerek Frampton'ın tektoniği kullanış biçimleri, gerekse teknoloji kavramıyla olan farklılığı üzerinden giderilmeye çalışılmıştır.

Bu kısmın devamında sıra, çalışma kapsamında mimari tektonik kuramı bağlamında irdelenecek olan duvarın içinde bulunduğu güncel durumun ortaya konmasına gelmiştir. Bernhard Siegert ve Adrian Forty'nin makaleleri, duvara duyulan gereksinimin kaybolmasıyla söz konusu mimari bileşenin yok olmakla karşı karşıya olduğunu ortaya koymaları bakımından önem arz etmektedir. Roger Riewe, katmanlaşma (İng. *layering*) ve katlanma (İng. *folding*) olarak ifade edilebilecek iki yöntemin, duvarın çağdaş mimarlıktaki kullanımında farklı alternatifler sunduğunu anlattığı makalesiyle, yine bu aşamada atıfta bulunulan bir diğer isimdir. Söz konusu iki yöntemin işlerlikleri Georges Teyssot, Greg Lynn, Anthony Vidler, Michael Speaks ve Hal Foster'ın da aralarında bulunduğu farklı mimar ve kuramcıların çalışmaları üzerinden değerlendirilmiş; bu sayede, tez çalışmasının stereotomiyi duvarın geri kazanımı bağlamında irdelemesiyle özgün bir konumda olduğu da ortaya konulmuştur.

Tektonik kuramı bağlamındaki tartışmalar, stereotomik yapım sisteminin güncel mimarlık kuramı ve pratiğinde giderek daha fazla yer tuttuğunu gösteren çalışmalar üzerinden genişletilmiştir. Bir tür paradigma değişikliği olarak da ifade edilebilecek bu yönelimin gerekçeleri Stan Allen, Kenneth Frampton ve Hashim Sarkis'in çalışmaları üzerinden açıklanmaya çalışılmış; stereotomik inşa, katmanlaşma ve katlanmanın yanında, duvarın geri kazanımı bakımından üçüncü bir yöntem olarak tariflenmiştir. Dahası, stereotomik inşanın diğer iki yöntemden farkları ortaya konmuş, onlara göre avantajlarının altı çizilmiştir. Bu noktada Gevork Hartoonian'ın Yeni Brütalizm olarak ifade ettiği çalışmalara değindiği makalesi, Giuseppe Fallacara, Francesco Defilippis ve Brandon Clifford gibi stereotominin geri dönüşünü dijitalleşmenin sunduğu imkanlar üzerinden okuyan isimlerin metinleriyle, önceki metinler arasında bir tür köprü vazifesi görmüştür.

Kuramsal çerçevenin çizilmesinden sonra, teorik modelin ortaya konulmasına geçilmiştir. Bu amaçla, literatür taramasında Karl Bötticher ile Gottfried Semper'in metinlerinden çıkarsanmış kavram ikilileri, yani ontoloji - temsil ile tektonik - stereotomik, kuramsal bir koordinat sistemi diyagramı üzerinde bir araya getirilerek, tekil duvar örneklerinin üzerinde karşılaştırmalı olarak incelenebileceği bir analiz sathı oluşturulmuştur. Ancak buraya geçilmeden önce, söz konusu örneklerin seçilebilmesi için duvarın tektonik davranışının değişkenlik gösterdiği tarihsel fragmanlar seçilmiştir. Söz konusu fragmanlardaki tektonik davranış çeşitliliği, duvarın ontolojik nitelikleri, yani taşıyıcılık ve geçirgenlik üzerinden irdelenmiştir. Akabinde her bir duvar örneğine ait tektonik davranışa ait bulgular, sözü edilmiş olan koordinat sistemi diyagramı üzerinde ifade edilmiştir.

Bu bulgulardan hareketle, mimarinin en temel bileşenlerinden olan duvarın, özellikle de Modern Mimarlık'ın etkisi altında giderek tektonikleştiği; sonuçta, stereotomik ve tektonik davranışları arasındaki, aynı şekilde ontolojisiyle temsili arasındaki dengenin giderek yitirildiği ortaya konulmuştur. Duvar, ontolojik niteliklerinden yoksun,

yalnızca temsil etme kapasitesi kalmış bir yüzeye dönüşme riskiyle karşı karşıya kalmıştır.

Bu bağlamda, yeniden yorumlanmış, yeri geldiğinde tektonik ile melezlenen, alışılagelmiş malzemelerin dışında malzemelerle üretilen, jeolojikleşmeyle dijitalleşmeden beslenen bir stereotomik geri dönüşün, duvarın içinde bulunduğu ontolojik krizin aşılmasında bir tasarım yöntemi olarak değerlendirilebileceği sonucuna varılmıştır. Stereotomi, özellikle de taşıyıcılıkla temsil arasında, dekorasyon vasıtasıyla kurduğu doğrudan aktarım sayesinde, duvarın ontolojisiyle temsili arasındaki kopukluğu giderecek bir yol sunmaktadır. Giderek tektonikleşen, buna koşut olarak metalaşan, daha önce de ifade edildiği üzere yok olmaya yüz tutmuş olan duvar, stereotomik yapım sistemi sayesinde, önemli bir mimari bileşen olarak çağdaş mimarlık pratiğinin repertuarına yeniden kazandırılabilir.

1. INTRODUCTION

1.1 Aim

“Roofs, walls, windows and doors do not fulfil their function anymore, and this explains why we are beginning to feel homeless. As we can’t really go back to tents and caves (even if some people try to), for better or worse we have to design a new type of house” (Flusser, 2012, 82).

This thesis study aims at understanding how re-interpretation of stereotomy helps to reposition the wall, which lost its importance as a fundamental architectural element and became redundant, within contemporary architectural discourse.

Especially with the introduction of Modern Architecture, the wall started to lose its importance. In other words, its existence started to become questionable. This disappearance can be observed throughout history, especially through phases and in specific cases. Nevertheless, contemporary stereotomy provides means to reposition the wall as a fundamental architectural element, as it was used to be.

Today, it is possible to see various contemporary architectural examples, investigating manifold opportunities of a stereotomic architecture. However, in spite of these attempts within the scope of practice, along with various theoretical investigations directly related with them, there is a lack of theoretical framework which would position these attempts within a larger cultural context, and more precisely, within the scope of the ongoing debate on architectural tectonics.

This thesis study tries to position itself in the gap between contemporary stereotomic re-interpretations and the theory of architectural tectonics, dating back from the 19th century. Through the lens of the said theory, and based on its theoretical model, it analyzes the wall’s evolution throughout specific historical sections. Finally, it suggests that the re-interpretation of stereotomy has the potential to challenge that evolution, while reclaiming the wall as a fundamental architectural element.

1.2 Scope

As mentioned previously, this thesis study attempts to fill the gap between contemporary stereotomic applications and re-interpretations, and the theory of architectural tectonics. It tries to provide a theoretical basis, based on the old but ongoing discourse on architectural tectonics, for these stereotomic experiments. Therefore, it confines its arguments within the limits of the said theory, and forms its theoretical model, with which it analyzes the wall's evolution throughout history, accordingly.

It is critical to define the scope of this study in a clear way, not only because of its integrity and academic authenticity, but also because of the challenges of talking about walls in general. Indeed, there are various reasons behind these challenges: First of all, focusing on a specific architectural element is not very common (although there are exceptions); since, today, talking about architecture can be said to necessitate talking about space. Because of the primacy given to space, all architectural elements tend to be discussed in accordance with their abilities to provide space, in other words, their spatialities. Like in the case of the architectural elements defined by Gottfried Semper, that will be one of the topics of the theoretical framework, where all the elements protect the hearth positioned at the center, the space itself often becomes the focal point of the architectural theory, surrounded by individual architectural elements.[1]

Secondly, wall itself, because of its ability to work as a border or boundary[2], has always been the central topic of a political inquiry, besides others from various fields. Nevertheless, here, in accordance with the aim of the thesis study that is defined in the previous section, the scope is kept within the limits of the theory of architectural tectonics, and its specific terminology.

The study starts with a theoretical framework consisting of three parts: The first part aims at defining the wall, as used in this study, followed by the notion of tectonics, based on its lexical meanings, along with its etymological origins. Tectonics's definition will provide the basis for a general understanding of this widespread term, that is often misunderstood. Following this, the notion of stereotomy will be defined;

1 It can be argued that the Venice Biennale of Architecture that took place in 2014 and curated by Rem Koolhaas, entitled "Fundamentals", and including the exhibition "Elements of Architecture", stands out as an exception.

2 Richard Sennett investigates the differences between border and boundary conditions in his article entitled The Public Realm (Borders and Boundaries), that will be mentioned in the theoretical framework.

since, it is important to understand the duality of tectonic and stereotomic, in order to analyze the wall's tectonic evolution through historical sections.

The second part includes readings from selected fundamental texts by two pioneer names, Karl Bötticher and Gottfried Semper, architects and theoreticians who worked and wrote in the 19th century Germany, and played critical roles in the introduction of the notion of tectonics to architectural theory. These readings will help to establish a theoretical framework, with which to trace the wall's tectonic evolution.

The third part includes a selection of recent theoretical studies, which will be used both for opening up the discussion on tectonics started almost two centuries ago, referred in the previous part, and for determining this study's position within contemporary architectural discourse.

A theoretical model, established in reference to the theoretical framework of the previous chapter, will be used to analyze the wall's tectonic evolution as an archetypal architectural element. The model in question will be used on specifically selected wall examples, a series of fragments of history, in such a way to illustrate the said evolution until today.

This will be followed with a chapter dedicated to the findings based on the analyses of the third chapter, illustrating the wall's tectonic evolution on a series of coordinate system diagrams. And finally, the conclusion will attempt to draw a picture of the contemporary stereotomy, as a means to reposition the wall as a fundamental architectural element.

1.3 Method

As mentioned previously, in this thesis study, I am going to analyze the wall's tectonic evolution and consider the re-interpretation of stereotomy as a way to challenge the wall's on-going process of tectonization.

In order to conduct the said analysis, I am going to propose a theoretical model, which will be defined in detail at the beginning of the 3rd chapter, where I will be looking at the wall's tectonic evolution. However, it is important to outline the way this model is working, here within the introduction, for drawing a clear picture of the thesis study before going into details.

The analysis in question will be conducted through phases, fragments taken from history. I will define specific moments in the wall's tectonic evolution, and attempt to

decipher them through the lens of the said theoretical model, based on the juxtaposition of the pairs of notions.

The model in question consists of the definition and investigation of the wall's fundamental functions, as one of the basic architectural elements, and the establishment of a coordinate system diagram, consisting of two dialogical axes: First of all, walls belonging to each case will be evaluated in terms of their functions, which will be identified as their abilities to work as load-bearing and/or dividing elements. By relating these abilities with tectonic and stereotomic characteristics, it will also be possible to define each wall's standing as a tectonic and/or stereotomic entity.

Following the reading of the walls within time, and based on their functions, I will start placing them on coordinate system diagrams. This way, I will be able to illustrate and compare different cases' specific behaviors. As mentioned previously, the coordinate system will be based on two orthogonal axes. At the ends of these axes, I will place two pairs of notions: "Ontology" - "Representation" and "Tectonic" - "Stereotomic".

The notions in question will be deducted from the readings included in the theoretical framework. By relating and juxtaposing these pairs of notions with the walls' functions, it will be possible to draw a clear picture of the wall's tectonic evolution through history.

Finally, re-interpretation of stereotomy, selected as the last phase of the said evolution, will be distinguished from both its predecessors and other contemporary design methodologies, with its capacity to reclaim the wall as a fundamental architectural element. In order to do so, I am going to refer to my theoretical model and evaluate my findings, while also expanding the limits of the discussion with the help of additional concepts, which will help me position this thesis study somewhere between the theory of architectural tectonics and contemporary stereotomic experiments.

2. THEORETICAL FRAMEWORK

This chapter consists of three parts, which, respectively, attempt to define the wall and the notions of tectonics and stereotomy, to establish a theoretical framework based on readings from fundamental texts by the pioneers of the theory of architectural tectonics and finally, to define the positioning of this academic research within current debates around the notion.

Indeed, there is a widespread literature on tectonics, touching on its different aspects. Therefore, for the sake of the study's coherence and precision, it is critical to confine the sources to be looked at. As mentioned before, two names will be at the center of the section Theoretical Background: Karl Bötticher and Gottfried Semper. The specificity of these two German architects and theoreticians from the 19th century, lies not only in their pioneering role in the introduction of the notion of tectonics to architectural theory, but also in the way they respectively articulated this notion as a kind of bridge between material and structural realities and their appropriate expression, and as a dichotomy between the "tectonics of the frame, in which lightweight, linear components are assembled so as to encompass a spatial matrix, and the stereotomics of the earthwork, wherein mass and volume are conjointly formed through the repetitious piling up of heavyweight elements" (Frampton, 1995, 5).

The third part itself, entitled Current Debates, is divided into three sections. In the first one, "Tectonics in Architectural Theory", I will refer to some current architectural debates around the notion of tectonics, in order to deepen the scope of my readings from various fundamental texts by Bötticher and Semper. The objective is, first of all, to bring the notion of tectonics- originating from the end of the 18th century, and developed especially in the middle of the 19th century- within the confines of the contemporary architectural theory and to define the position of this study in relation to it. It consists of a list of the term's usages by Kenneth Frampton, who reinstated the important role and the continuing validity of the notion of tectonics within both theoretical and practical architectural domains, along with an extensive comparison between the notions of tectonics and technology. This comparison is done by referring to Gevork Hartoonian, who attempts to redefine, or rather, with his words, "recode"

tectonics (Hartoonian, 1994, 5), Demetri Porphyrios, who brings forward the concepts of "freedom" and "necessity" in order to differentiate the two terms (Porphyrios, 2002, 134-135), Dalibor Vesely, who talks about technology within the architectural context and of course, Martin Heidegger, who speculates about these terms from a broader perspective.

The second section, "The Wall's Ontological Crisis", provides us with a panoramic view towards the current status of this fundamental architectural element. As will be explained, especially under the impact of Modern Architecture, walls started to disappear from the architectural scene. In order to define the reasons of this disappearance, I will first refer to Bernhard Siegert and Adrian Forty and look at their articles in the GAM Magazine's 9th Volume, dedicated to the walls. Roger Riewe's article in the same volume will be another reference, since it brings forward two attitudes towards the wall in contemporary architecture, which may counter the disappearance in question. These two threads will be further investigated through additional readings from Georges Teyssot, Greg Lynn, Anthony Vidler, Michael Speaks, Hal Foster and others.

The third section, "Attempts Towards a Stereotomic Approach", focuses on theoretical works related specifically with stereotomy and their validity as a third attitude in contemporary architecture, which can help develop a new understanding of the wall. First, I will look at several texts by Stan Allen, Kenneth Frampton and Hashim Sarkis, in order to decipher the reasons of the general interest in contemporary architectural theory, towards stereotomy. I will refer to Gevork Hartoonian once more; nevertheless, this time, in terms of his concentration on New Brutalism. His analysis will work as a kind of bridge between the previous section, and the texts from Giuseppe Fallacara and Francesco Defilippis, researchers both from the Faculty of Architecture of Bari Polytechnic, along with the work of Brandon Clifford, providing critical insights towards a new, or rather, re-interpreted stereotomy.

2.1 Definitions

The objective of the theoretical framework's first part is to define the wall and the notion of tectonics, which, as a line of thought within architectural theory, forms the scope of this thesis study. Considering the large number of uses for the term in question, without defining the way it is used here, it will not be possible to obtain a

clear language. Following the definition of tectonics, I will continue with a neighboring term: Stereotomy.

2.1.1 Wall

Considering the multitude of its types, attempting to define the wall can be seen as a challenging task. Therefore, it is important to decipher the traits that make a random vertical surface, *a* wall. As a fundamental architectural element, wall is generally characterized by its functions. In fact, its definition in the Oxford Engish Dictionary coincide with these functions. Given as "a defensive structure enclosing a city, castle, etc. Chiefly plural, fortifications" (URL-47), it refers to its "structural" character, while also mentioning its attribute as a protective element, dividing inside and outside.

In fact, these two traits, being structural and/or dividing, define the wall from the very "beginning". Since the cave and the primitive hut, there are two fundamental types of wall: The load-bearing wall and the partition wall. Lorraine Farrelly's definition in *The Fundamentals of Architecture*, stated as "the wall is one of the architectural elements that surround and define the space, it is the border between interior and exterior. Load-bearing walls carry the building structure, floors and roof, while non-load-bearing walls serve as a divider" (Farrelly, 2011, 75), coincide with these two traits.

In order to define the wall, it is necessary to detail these two functions furthermore. Before investigating its role as a structural entity, I am going to start with its role as a dividing element. The wall is not an entity standing alone in space, but dividing the space into different sides. In fact, as soon as it is placed on a territory, it acts as a border creating inside(s) and/or outside(s). Therefore, it is possible to claim that behaving as a border is an intrinsic characteristic of a wall.

In order to define the border, we have to understand the reason why it appeared in the first place. As Doğan Kuban explains, all livings are forced to a "special act of building", by their "instinct of self-defence" (Kuban, 2014, 14). In fact, it is this instinct that differentiates this act of building from other tool making processes, even though all these follow the same steps: "a certain requirement", "design of a form appropriate to that requirement", "design of a structure supporting that form", "appropriate material and technique for realizing that design" (Kuban, 2014, 14). According to Kuban, under the influence of that instinct, the special act of building

becomes an act of separation (from the environment), which detaches a piece of the "infinite universe, hard to be comprehended by the eye and the imagination", bordered in such a way to feel safe inside. Kuban explains that "it is this willingness to border the void, that starts the special act of building" (Kuban, 2014, 14). To put it another way, because of the instinct of self-defence, the act of bordering, separating, becomes a universal, ontological function of the wall.

Since acting as a border can be considered as an intrinsic quality of the wall, it is necessary to define what a border is. To do that, I am going to refer to Richard Sennett, who explains it in terms of its differences from the boundary, through natural analogies. According to Sennett, "borders are the zones in a habitat, where organisms become more inter-active, due to the meeting of different species or physical conditions", whereas "the boundary is a limit; a territory beyond a particular species does stray" (Sennett, 2016). Indeed, this opposition shows that one of the major attributes of the border, and the main reason why it is used here, is its ability to correlate different domains, instead of working as a definite barrier. In reference to Sennett, it is possible to illustrate this with an example at the cellular level, where there are also two edge conditions: the cell wall and the cell membrane. While the former works as a "container", the latter, with the help of its "porous" and "resistant" character, allows a selective relationship between inside and outside of the cell.

Instead of underlining the opposition between the two terms like Sennett, it is possible to suggest that each wall is a border, but in various degrees. In other words, each wall has the ability to establish a selective relationship between different sides. In order to support this idea, I will also refer to Martin Heidegger. In his essay "Building, Dwelling, Thinking", Heidegger talks about border, in such a way to underline this special status: "What the word for space Raum, Rum, designates is said by its ancient meaning. Raum means a place cleared or freed for settlement and lodging. A space is something that has been made room for, something that is cleared and free, namely within a border, Greek peras. A border is not that at which something stops, but, as the Greeks recognized, the border is that from which something begins its presencing" (Heidegger, 2024).

So that I defined "border" by differentiating it from "boundary", in order to illustrate the relationship between the wall and its environment, I am going to refer to the characteristics of that "environment".

Wall, as its border, defines the space. Indeed, even at first reading, this statement implies a binary system, consisting of the space, the non-space (or the *other* space) and the wall as a border, in-between. With the help of the wall, a piece of the universe is detached from the rest, and becomes *the* space. Based on this definition, the universe can be considered as an agglomeration of such spaces, composed of insides and outsides, territories detached from each other by walls. Nevertheless, even if this is a metaphorical description, this logic of compartmentalization is not working in practice, as can be observed in natural phenomena like animal habitats, atmospheric zones, and so forth.

Also, at the metaphorical level, this binary system of insides and outsides remains reductionist. According to Gaston Bachelard, inside and outside form a "tidal" dialectic, which has an evident geometry, and this evident geometry blocks our thinking, when we attempt to reformulate it in a metaphorical way (Bachelard, 1994, 211). In such an evident geometry, borders do not act like boundaries, and walls become the edge where the interior ends and the exterior starts (or vice versa), in opposition to Heidegger's statement mentioned above.

In addition to the reductionism caused by the geometric evidence of the dialectic between interior and exterior, based on the idea of drawing a definitive line in-between, making an absolute definition of these opposite sides is not possible. Firstly, drawing a definitive line reduces the status of the wall to a surface working only as a border, which has a limited relationship with both of its sides. Secondly, these sides are not constant entities, they are relative. In reference to Belgian poet Henri Michaux's verses, Gaston Bachelard illustrates how these "distinct" zones can actually be interchangeable, and how the line in-between cannot remain indifferent, or inactive: "Outside and inside are both intimate -they are always ready to be reversed, to exchange their hostility. If there exists a border-line surface between such an inside and outside, this surface is painful in both sides" (Bachelard, 1994, 218).

In order to illustrate the way to think outside of the dialectic of inside and outside, I will refer to Tim Ingold's terminology. Ingold states that "it is more usual to think of persons or organisms as blobs of one sort or another" and that "blobs have insides and outsides, divided at their surfaces" (Ingold, 2015, 3). In reference to Ingold, it is possible to consider the spaces we described above, as blobs, and the surfaces dividing them, as walls placed in-between. Nevertheless, according to Ingold, even though it is

considered this way, the universe is not made of blobs alone, but also, and certainly, with lines. It is critical to consider the universe as a combination of blobs and lines, because it gives us the necessary tools to develop an understanding of spatiality, outside of the binary system consisting of blob-spaces, divided by wall-surfaces. In opposition, it is a space where everything is interwoven, a space which is not compartmentalized, but if we use Ingold's terminology: a space which is "knotted".

It is possible to state that as a border, the wall both separates (detaches a piece of territory from the universe), and selects (establishes a selective relationship between inside and outside). Indeed, each wall type has a capacity to work as a separator or a selector. In order to develop this argument, I am going to refer to Bernard Cache and the conceptualization of "frame" in his seminal book, Earth Moves: The Furnishing of Territories. According to Cache, architecture is an operation of framing, "introducing intervals in a territory in order to construct frames of probability" (a definition parallel to Kuban's "special act of building") and "this presupposes that the architectural frame fulfills at least three functions, whatever the concrete purpose of the building might be" (Cache, 1995, 22). Here, usage of the term "interval" is meaningful, because, by framing, architects tend to delimit the causes that will produce results (in Cache's words, "forms of life"), within that spatial interval. Thus, Cache positions the architect as the designer of a system (rather than a final product), and the architectural elements, as composers of a human habitat.

Among the functions defined by Cache, the first one is "separation" and "its functional element is the wall" (Cache, 1995, 22). In order to create a "frame of probability", where life will occur, first, a territory has to be delimited, detached by walls. In other words, walls tend to operate as separators, physical barriers on the territory. Bernard Cache's second architectural function is "selection", for which, the functional tool is "window". Through the window, the aforementioned relationship between inside and outside can be developed. Indeed, the window operates in a selective way, as suggested with the function's name, and lets in only the selected parts of the outside, like the cell membrane. In Cache's words, "the first function of the frame removed us from the territory; the second function reestablishes connections, selectively" (Cache, 1995, 23). As a matter of fact, with the help of the window, besides the physical barrier

defined with separation, a visual barrier is established through selection.3 And finally, wall stands out as an architectural element that divides, both physically and visually.

Since behaving as a border has already been defined as a universal function of the wall, it is now time to concretize the way it operates as a structural element. Kuban, who I referred to for his emphasis on the need for dividing space (with the help of walls), defines walls as "continuous load-bearing elements" (Kuban, 2014, 41). According to him, "the wall, which is a continuous load-bearing element, takes the loads from the roof and transmits them to the foundation. For this, it must be durable enough. This durability is the power of the wall to carry the force per unit surface [...] Thus, the loads from the roof and horizontal elements and its own weight generally determine the width of the wall" (Kuban, 2014, 41).

As a structural surface, on which vertical and horizontal loads are being carried following the principles of gravity, wall tends to get weakened with openings on it. Kuban states that "every gap weakens the wall" (Kuban, 2014, 42). Therefore, it is critical to find additional structural solutions, wherever there is an opening, such as arches, or lintels. Also, openings on the wall necessitate it to be strong enough to compensate for the weakness they cause, making it thicker, or requiring for buttresses, pilasters between openings. Kuban explains that "the load-bearing wall, as a space-limiting element, is formed under the combined effects of bearing conditions and the need to illuminate the interior space", and, "to the extent that the forces coming from the cover can be controlled, lighting can be treated freely. The more the cover loads can be brought to single points, the further the wall moves away from its load-bearing character" (Kuban, 2014, 42).

In fact, it is possible to claim that, it is this balanced position, between being structural and dividing, load-bearing or pierced with openings, that makes wall a critical object for the theory of architectural tectonics. Since, tectonics itself is a domain where structure and esthetics, ontology and representation merge, as I will explain in the next part. Finally, it is no surprise for a study that attempts to remain within the limits of the said theory, to lay its focus on the wall, and investigates it in terms of its capacities to carry and divide.

3 At this point, it is necessary to explain that in our case, the window is defined as an intrinsic trait of the wall itself, and not a distinct architectural element. In parallel with this admittance, windows are considered as qualities belonging to the wall surface.

2.1.2 Tectonics

In order to shape a general understanding of the notion of tectonics, this first part both looks at its lexical meanings and its etymological origins. By trying to interpret the relationship between these meanings and origins, and by looking at the transitions among them, it is possible to form a basis for our respective readings from Karl Bötticher and Gottfried Semper, which will be supported by a variety of interpretations by different theoreticians, complementing these original texts in such a way to locate them within a larger cultural context.

Before starting to define tectonics, it is necessary to emphasize the difficulty of the task at hand. In his book *Introducing Architectural Tectonics*'s first chapter, "Investigating the Tectonic", Chad Schwartz states that "no single definition exists that conveys the full meaning of the term tectonic, primarily because it has evolved over time" (Schwartz, 2017, xxxii). In fact, as will be discussed in the second part of this chapter, as a notion which was brought forward within architectural theory approximately two hundred years ago, tectonics still continues to evolve. Therefore, the objective of this part will be to outline the term, in such a way to form a background for our readings in the following part.

In the Oxford English Dictionary, there are two distinct definitions attributed to the term tectonics. The first one refers to the term's use within geology, as "relating to the structure of the earth's crust and the large-scale processes which take place within it" (URL-45). Even though it may seem irrelevant with the general understanding of the term within architectural discourse, this first meaning will be further investigated within the confines of this study, considering its stereotomic connotations.

The second meaning in the Oxford English Dictionary, phrased as "relating to building, construction" (URL-45), can be considered as the generally accepted usage of the term within architectural discourse. Nevertheless, as will be further detailed in the following section, in reference to Bötticher and Semper, along with interpretations of their writings by various architectural theoreticians, this is a reductive usage of the term, considering its tendency to compensate tectonic only with construction, or rather, with the material and structural realities of the building.

Now that the term's lexical meanings are listed, it is time to investigate it through its etymological origins. Besides the two meanings given above, the dictionary provides

the term's origin as the Greek word "tekton", referring to "carpenter, builder". Even though at the beginning the notion of tekton referred to an artisan using timber as his material, with time, it started to cover a broader sense and its definition included the act of making as a whole (Frampton, 1995, 4).

Besides tekton, depending on the sources, it is also possible to claim that tectonics derives from another Greek word, which is techne (Schwartz, 2017, 2). Techne "refers to a kind of knowledge. It implies method and consistency and it represents man's reasoned intelligence put into practice. Techne is an ordered application of knowledge that is intended to produce a specific product, or achieve a predetermined goal" (Porphyrios, 2002, 130).

As mentioned at the beginning of this part, the reason why I am looking at tectonics' lexical meanings and deepen my findings with the help of the term's etymological origins, is not to give an exact definition, nor to pursue a linguistic argumentation; but rather, to shape a general understanding around the notion.

In fact, juxtaposing the meanings and the origins can give us an outline of the term. Even though they seem unrelated with each other when defined separately, it is possible to "merge" the terms tekton and techne, as does Porphyrios in his article "From Techne to Tectonics": "If the builder, therefore, as tecton, is primarily a carpenter and only by later extension an artisan working in metal, stone, clay, paint, etc, his techne - that is the organised body of knowledge related to his production - is surely superseded by tektonike, carpentry, from which the word tectonics derives." In a way, tectonics is "the techne of carpentry", (Porphyrios, 2002, 134-135), the knowledge of building.

At this point, it is also necessary to differentiate "tectonics" as a noun, from "tectonic" as an adjective. In this study, I am using the term tectonics as an umbrella concept, referring to an old but still viable theory, the theory of architectural tectonics. The theory in question includes what is tectonic, but, as the knowledge of building, reaches far beyond. Tectonic as an adjective, on the contrary, refers to a specific construction system, consisting of building with the help of assembled or attached, linear, filigree elements (e.g. Figure 2.1).

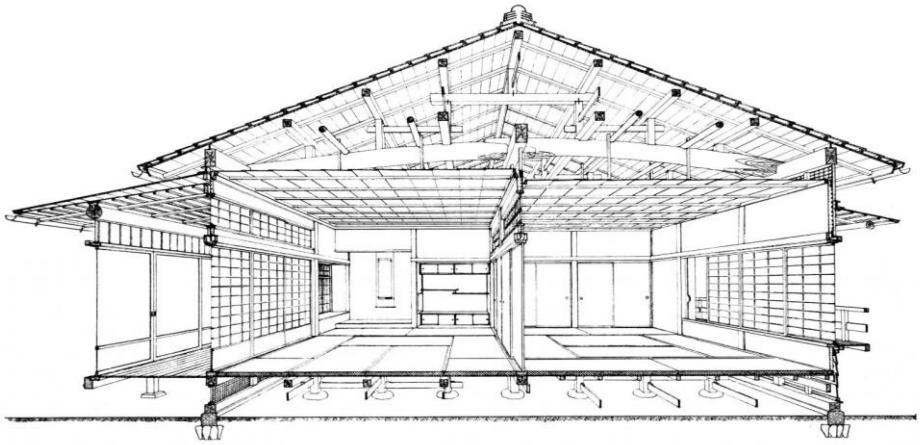


Figure 2.1: Section through one storey traditional Japanese house, exhibiting tectonic features (URL-1).

2.1.3 Stereotomy

Following the definition of the term "tectonics" (along with "tectonic" as a specific construction system, also covered in the theory of architectural tectonics), it is also necessary to look at a complementary term: "Stereotomy" (along with "stereotomic" as an adjective). Kenneth Frampton, defining the duo of tectonic and stereotomic as opposites, explains: "it is characteristic of our secular age that we should overlook the cosmic associations evoked by these dialogically opposed modes of construction; that is to say the affinity of the frame for the immateriality of the sky and the propensity of mass form not only to gravitate toward the earth but also to dissolve in its substance" (Frampton, 1995, 7).

In contrast with the relationship between "tectonics" and "tectonic", in this study, there is not a differentiation between "stereotomy" as a noun and "stereotomic" as an adjective. Here, it can be said that a stereotomic object exhibits stereotomy's characteristics, which will be detailed later on. In fact, it is possible to say that tectonics, as an umbrella concept, also covers stereotomy, which refers to a specific construction system, based on the process of cutting solids, as will be explained below.

As a term belonging to the field of descriptive geometry, stereotomy is defined as "the science or art of cutting, or making sections of, solids; that department of geometry which deals with sections of solid figures" (URL-44). It is important to pay attention to the use of a generic term such as "solid", instead of a particular term such as "stone", referring directly to a specific construction material, contrary to the general

understanding of the notion. In fact, the word's etymological origin supports this emphasis (Dostoğlu & Uluoğlu, 2022, 195). As Kenneth Frampton states, "that this last depends upon load-bearing masonry, whether stone or mud brick, is suggested by the Greek etymology of stereotomy, from stereos, solid, and tomia, to cut" (Frampton, 1995, 5). Based on the lexical meaning and the etymological origin of the term, and considering the context of this thesis study, it is necessary to specify that, here, stereotomy will be seen independent from any material connotations, and rather, as a method of piling up, agglomerating, or carving solid materials.

Nevertheless, in spite of the "immaterial"[4] character of the term, it is important to clarify that the notion is tightly related to stonecutting, as Robin Evans explains: "Stereotomy, which means the cutting of solids, was a seventeenth-century French rubric under which were gathered several existing techniques including stonecutting, which remained the principal concern" (Evans, 1995, 179). Although it is free from material connotations, in order to develop a contemporary understanding of stereotomy with the aim to counter the wall's ontological crisis, it is necessary to "learn from the past" and look at the specific ways stonecutting techniques were applied, even thousands of years ago, as Victor Hugo poetically describes in his seminal *The Hunchback of Notre Dame* (2010):

"The first monuments were simple masses of rock ... . Architecture began like all writing. It was first an alphabet. Men planted a stone upright, it was a letter, and each letter was a hieroglyph, and upon each hieroglyph rested a group of ideas, like the capital on the column. This is what the earliest races did everywhere, at the same moment, on the surface of the entire world. We find the 'standing stones 'of the Celts in Asian Siberia; in the pampas of America" (Hugo, 2010).

Lying at the heart of the stereotomic knowledge, although forgotten nowadays (if the recent tendency to reappropriate it as a contemporary architectural approach is set aside), stonecutting is certainly the representative of a long architectural tradition. A tradition of architectural creativity, apart from a long history... In fact, it is important to emphasize that, even the earlier, anonymous, vernacular (here, the term "primitive"

4 Here, "immaterial" is used as the opposite of "material". However, it is necessary to underline that this does not have to be the case. As Vilém Flusser states, "whatever 'material 'may mean, it cannot mean the opposite of 'immaterial'. For the 'immaterial ' or, to be more precise, the form is that which makes material appear in the first place. The appearance of the material is form" (Flusser, 2012, 28-29).

is consciously avoided) examples of stonecutting, in contrast with the biased assumption that they are "random, arbitrary, illogical, and unordered", are always based on an intelligence which can be deciphered, reformulated and applied within contemporary contexts. Referring to early stone wall examples, Brandon Clifford underlines this fact: "Yes, they might be random -a result of sourcing and salvaging. But they are not arbitrary. By carefully evaluating and reverse engineering these walls, we learn they are highly ordered, premeditated, methodical, and most important for us - replicable!" (Clifford, 2017, 92).

While developing a contemporary stereotomic architecture, stonecutting examples from the past can be considered as important sources of inspiration. Depending on the type of intelligence used for their construction, these examples can be split into different categories. Nevertheless, as Clifford emphasized in reference to different cultures' stone works, boundaries of the categories in question are rather indeterminate: "The cultures responsible for these works produced a variety of architectural types ... , some of which co-mingle -megalithic, polygonal, and dry-stack walls as example. While there are discernible differences between them, they are also interdependent" (Clifford, 2017, 68).

In fact, as will be seen in the last section of the third chapter, entitled The Stereotomy Re-Interpreted, it is not necessary to replicate a stereotomic operation in a literal way, in order to define a contemporary architectural example as "stereotomic". In fact, it is by re-interpreting a conventional operation of piling or carving, that contemporary architects and designers became able to re-use this ancient construction method. Nevertheless, I am going to deepen this discussion in the final part of this chapter, entitled "Attempts Towards a Stereotomic Approach", since, here my focus will be on the definition of the notion. In order to do so, besides looking at its lexical meaning and etymological origin, it is necessary to define stereotomy's characteristics.

2.1.3.1 Establishment of a part-whole relationship

We can consider the joining of the cut solids to form complex geometries as the parts forming a whole. Nevertheless, defining stereotomy only as a linear relationship from the part to the whole will not be enough to fully comprehend the term (Dostoğlu & Uluoğlu, 2022, 196). In fact, there may be an "opposite" stereotomy, going from the

whole to the part, and constructing by carving a volume, also coincides with a stereotomic operation. After all, in either of the cases, construction is based on the idea of cutting solids, in parallel with the term's definition. I can clarify that stereotomy is a process that both goes from the part to the whole, and also from the whole to the part, with two examples: For the first one, we can think of walls made by piling up the cut stones, and for the latter, we can imagine a cavern composed of carved volumes (Dostoğlu & Uluoğlu, 2022, 196).

2.1.3.2 Translation into decoration

In stereotomy, structural and material essence can be read through decoration which reflects the construction system. However, legibility of the decoration is very critical; since, it is by understanding the way the parts have been assembled to form a stereotomic component, or in contrast, the way this whole has been carved, that this reading can be realized (Dostoğlu & Uluoğlu, 2022, 196).

According to Defilippis, in stereotomic architecture, there are two decoration methods: Texture and mouldings. While the former is related to the surface (e.g. Figure 2.2), the latter is interested in the depth (e.g. Figure 2.3) (Defilippis, 2000, 954-957). I will further investigate the issue of decoration in the final chapter.



Figure 2.2: A wall detail from Machu Picchu, exhibiting the texture on the surface (URL-2).



Figure 2.3: The mouldings on Pantheon's dome (URL-3).

2.1.3.3 Space-making

In his article The Two Main Factors in the History of Stone Construction, Gottfried Semper states that "all events throughout architectural history can be divided into two major groups defined by the manner and extent to which stone construction embodied an architectural-spatial idea" (Semper, 2006a, 552). The first group consists of the cases "that merely employs the cutting of stone" (Semper, 2006a, 552), while the second includes examples where the spatiality is a direct expression of the stone construction. Semper explains the emergence of this second group, in relation with various construction tools like "joint cutting", "the arch" and "the vaulted ceiling" (Semper, 2006a, 552).

It is important to underline that Semper distinguishes these two groups, according to their respective relationships with tectonic. In the first group, "the role assigned to stereotomy and stone construction was only subservient": It was either mimicking the textile dressing, or building a tectonic framework in stone. In both cases, stereotomy replicates an originally tectonic operation (Dostoğlu & Uluoğlu, 2022, 198).

However, with the introduction of new construction tools, stereotomy started to generate space, and in Gottfried Semper's terms, became "a mighty spatial art" (Semper, 2006a, 553). Stereotomy's ability to make space is a consequence of its

relationship with descriptive geometry. By reflecting three dimensional objects onto planes, stereotomy can define the way the solids will be cut and stacked (Dostoğlu & Uluoğlu, 2022, 198).

2.2 Theoretical Background

After attempting to define the notion of tectonics, based on its lexical meanings and etymological origins, along with its counterpart, stereotomy, it is now time to look at the way the notion was developed in the writings of Karl Bötticher and Gottfried Semper, in a respective way. As was explained at the beginning of the Literature Review, these two architects and theoreticians played an important role for the notion's ongoing significance within architectural theory, in so far as Chad Schwartz states that "from these two men arose the theory of architectural tectonics" (Schwartz, 2017, xxxvi). Moreover, based on their writings, I am going to form a theoretical model with which to evaluate wall's tectonic evolution through time, based on specific cases. Nevertheless, before starting to dig into the readings from Bötticher and Semper, it is necessary to briefly touch on the theoretical background in Germany of the era; since, it is impossible to position these two pioneers of the tectonic culture, outside of their cultural context.

Even though tectonics' etymological origins lie in the Greek words techne and tekton, as explained in the previous section, which can be traced back thousands of years, its prominence within architectural discourse, "its underlying concepts", date back to the end of the 18th century Germany, or rather, Prussia (Schwartz, 2017, xxxii). As also mentioned by Kenneth Frampton, in his highly influential book, *Studies in Tectonic Culture: The Poetics of Construction in Nineteenth and Twentieth Century Architecture* (1995), the first use of the term tectonics in German, in terms of architecture, dates back to 1830. Published that year, Karl Otfried Müller's *Handbook of the Archaeology of Art* (1847) listed a variety of "art forms" (Frampton, 1995, 4), "such as utensils, vases, dwellings and meeting places of men, which surely form and develop on the one hand due to their application and on the other due to their conformity to sentiments and notions of art", and related them to the notion of tectonics: "We call this string of mixed activities tectonic; their peak is architecture, which mostly through necessity rises high and can be a powerful representation of the deepest feelings" (as cited in Frampton, 1995, 4). Even at this first use, it is possible

to see that the notion of tectonics remains in balance between "necessity" and a kind of "freedom" (two attributes of the notion, defined by Demetri Porphyrios, which were mentioned at the end of the previous part), transferred through representation. It is both a process of construction, surrounded with necessities, and an object of representation, different from a "crude" technological activity.

In fact, it is no coincidence that the notion of tectonics was developed and proliferated within architectural circles of the time, in Germany. Especially with the establishment of its first school of architecture in Berlin in 1799 (Berlin Bauakademie), followed by other institutions in various cities, the country had become a fertile ground in terms of architectural theory (Schwartz, 2017, xxxiii). Nevertheless, to concretize the reason why tectonics became a dominant line of thought within architectural theory in Germany, besides its newly developing architectural scholarship, we must emphasize the challenge that German architects had, in the face of opposing architectural styles.

As Frampton states, "from 1750 onward the antique Greek world exercised a fundamental hold over the German imagination" (Frampton, 1995, 61). In fact, throughout Europe, in the middle of the 19th century, "neoclassicism, amongst other styles, was building a strong following in architectural circles" (Schwartz, 2017, xxxii). However, this tendency towards Greek architecture was accompanied by an opposing desire, which was to revive the Christian religious art and architecture (Schwarzer, 1993, 269). The challenge, then, was to find a way to define a contemporary German architecture, between these two poles, while also having to adapt itself to new programmatic requirements, new structural solutions, and new materials. In fact, it is possible to say that Mitchellneocla Schwarzer's reference to Bötticher's "desire to resolve the dichotomy between romanticism and neoclassicism" (Schwarzer, 1993, 268), points at this challenge for a new architecture, but we are going to further detail this assessment later.

In the middle of this emerging architectural culture and the accompanying challenge mentioned above, Karl Friedrich Schinkel's name stands out, not only because of his stance as an important personality in the architectural circles of the era, but also for his impact on both Bötticher and Semper. Chad Schwartz underlines this fact by stating that, "among countless others, Schinkel's architectural attitudes provided a theoretical base for two individuals who studied and worked with him in Berlin in the middle of the nineteenth century: Karl Bötticher and Gottfried Semper" (Schwartz, 2017, xxxvi).

Even though he is a critical source of inspiration for both Bötticher and Semper, Schinkel's approach towards tectonics can be literally considered as a bridge to the former's own theory, which will be the concentration of this second part of the Literature Review. Although his theoretical statements are rare, and he is not directly part of this study, it is necessary to underline Schinkel's important role in the early stages of the development of the theory of tectonics and concretize the way he influenced Bötticher especially. In his literary fragments, Schinkel states in a determined way, that, "to build means to join different materials into a whole, corresponding to a defined purpose" (Schinkel, 2006, 402). This idea of "purposiveness" not only reverse the traditional hierarchy between the appearance of a building and its underlying structure, but also establishes a relationship between the two "counterparts". As will be explained later, this relationship forms the essence of Bötticher's theory of tectonics.

Besides his important impact on Bötticher's developing ideas, Schinkel, primarily a practicing architect and not a theoretician, has a large repertoire of projects, exhibiting different tectonic characteristics, in so far as Frampton interprets his architecture as being "suspended ... between the conflicting demands of ontological and representational tectonic form" (Frampton, 1995, 65). These various executions, especially the ones which exemplify "an architecture of structurally expressive Hellenic forms" (Schwarzer, 1993, 274), was crucial for the development of Bötticher's tectonic theory, which can be interpreted as an extension of the Schinkel's approach (e.g. Figure 2.4). Schwarzer explains that "given the close contact between the two men [Bötticher studied with Schinkel, after he got admitted to the Bauakademie in 1827], it was left to Bötticher to complete Schinkel's ideas and provide a comprehensive tectonic of spatial architecture" (Schwarzer, 1993, 274).



Figure 2.4: Altes Museum's main facade: "an architecture of structurally expressive Hellenic forms" (URL-4).

2.2.1 Karl Bötticher: Ontology - Representation

Following Schinkel's advice, during the late 1830s, Karl Bötticher started to work on the ornaments and their symbolic meanings in Greek architecture (Mallgrave, 2006a, 531). From these explorations, he had already started to develop his own theory of tectonics, which had a huge impact on the way the notion is addressed, in the following years. According to him, "every detail of a Greek temple (including the curvature of its profiles and mouldings) not only had a specific working function but also a higher function ... to idealize" (Mallgrave, 2006a, 531). Bötticher gathered his ideas, in his seminal book, *Die Tektonik der Hellenen* (The Tectonic of the Hellenes or Greek Tectonics), published in three volumes between 1843 and 1852, which, according to Frampton, became one of the fundamental references at the Bauakademie, after Schinkel's death in 1841 (Frampton, 1995, 81).

Bötticher's position as a defender of a contemporary German architecture, which should neither be romanticist, nor neoclassicist, was already mentioned above. He was "denying both the materialism of the former and the traditionalism of the latter" and "sought to resolve the dichotomy" (Frampton, 1995, 82) between them, in such a way to compromise these two tendencies with the help of a system based on the relationship among the ontology of the structure and the representation through ornament. In parallel with Schinkel, he was insisting that the representational character should never conceal the ontological essence. In fact, although seeming like counterparts, these two were related to each other, in such a way that "the beauty of architecture was precisely the explanation of mechanical concepts" (Schwarzer, 1993, 276).

It is necessary to emphasize that, although the idea of connecting the ontological essence and the representational character looks familiar and prevalent from a current perspective, it was contrary to the general assent in the mid-19th century Germany. Chad Schwartz underlines the novelty of Bötticher's position, by explaining that "while many theorists were focused on the imitation of objects or styles [aiming at resolving the stylistic problems of the era], Bötticher decided to focus his efforts on illuminating a building's internal processes, utilitarian nature, and 'infinite universe of forces'" (Schwartz, 2017, xxxvii), which would define the way the building is represented through ornament.

For Bötticher, to overcome stylistic challenges, nature was a good source of inspiration, in so far as, by following the same principles as nature, the Greek architecture, and its tectonics, was able to form a "law of form":

"The principle of Greek tectonics is demonstrably fully identical with the principle of creative nature: the concept of each creation corresponds to its form. From this single principle arises a law of form, which far transcends the individual arbitrariness of the working individual. It encompasses within its totality the only true and highest freedom and is an inexhaustible source of inspiration" (Bötticher, 2006a, 531).

Nevertheless, it is also necessary to clarify that for Bötticher, this did not mean to imitate natural form as it is, since, "architecture was an imitative art only to the extent that it imitated itself" (Frampton, 1995, 83).

Another characteristic of Bötticher's theory of tectonics was the reciprocity between the parts and the whole. Once more, the Greek building, an "ideal organism" formed by the union of its "members", was a good example:

"Every one of [Greek building's] members proceeds only from the whole, for this reason, each part is an imperative and necessary part, an integrating element of the whole, which conveys its special function and place to the whole" (Bötticher, 2006a, 532).

Each member must be thought of on its own, but also as part of a system, an "ideal organism", as can be seen on Greek architectural orders (Figure 2.5).

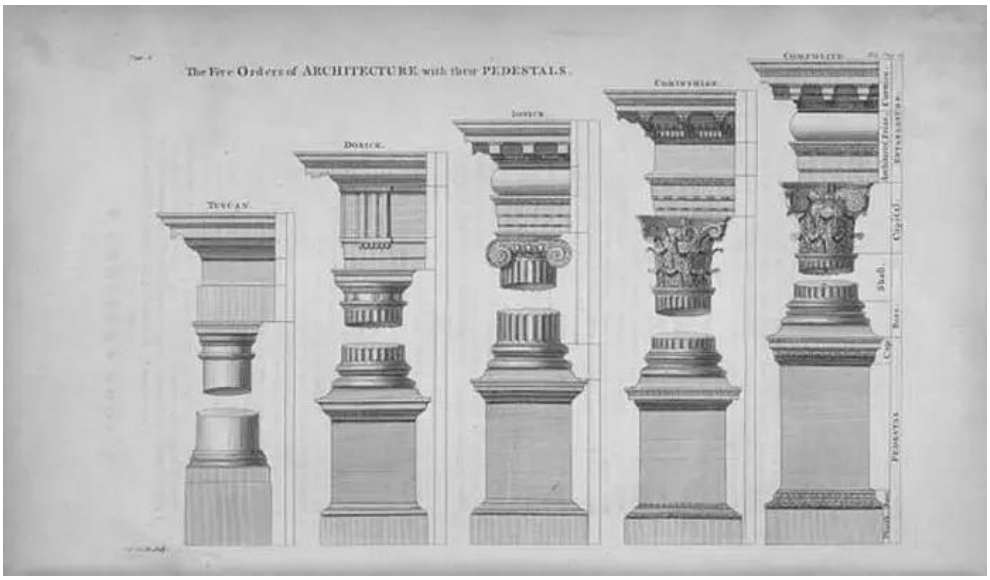


Figure 2.5: Orders in Ancient Greek Architecture (URL-5).

Bötticher's fundamental distinction between "core-form" and "art-form" in *Die Tektonik der Hellenen*, which further emphasizes the relationship between ontological and representational aspects of architecture, applies to each member forming the whole: "realization of the concept of each member can be considered through two elements: through the core-form [Kernform] and through the art-form [Kunstform]" (Bötticher, 2006a, 532). Realized within a binary logic, each member has therefore, both a core-form and an art-form, which express the member's ontological ("mechanical" and "necessary" in Bötticher's terms) and representational ("clarifying") aspects, respectively.

In fact, this binary logic is not only applied to the member as a unique entity, but also to its connections to adjacent members, as "it also encompasses the juncture of the parts working with it" (Bötticher, 2006a, 532). In that case, it is possible to say that Bötticher's theory of tectonics is not only based on the members and the whole, but also on the junctures. Because of the way these junctures were realized, with both a core-form and an art-form, union between the members can be considered as both "static" and "symbolic": "And just as mechanically all members are joined into a static unity, so also are the juncturing symbols of all members figuratively bound into a uniquely inseparable organism" (Bötticher, 2006a, 532).

Finally, it is possible to state that the relationship between ontological and representational aspects, forming the main theme of Bötticher's theory of tectonics, can be understood in terms of a system consisting of the members, the joints between

these members, and the union made up of joined members. A method used in Ancient Greek architecture, *Anathyrosis*, concretizes the union in question. Based on the idea of minimizing the surface of contact between two stones, *Anthyrosis* helps to refine the joints, without being seen from outside (Figure 2.6).

In fact, based on such a system, reciprocity between ontological and representational aspects of architecture is so evident that "they both have the same idea and both are born together," in so far as "only with its appearance does the concept of each member become evident" (Bötticher, 2006a, 532).

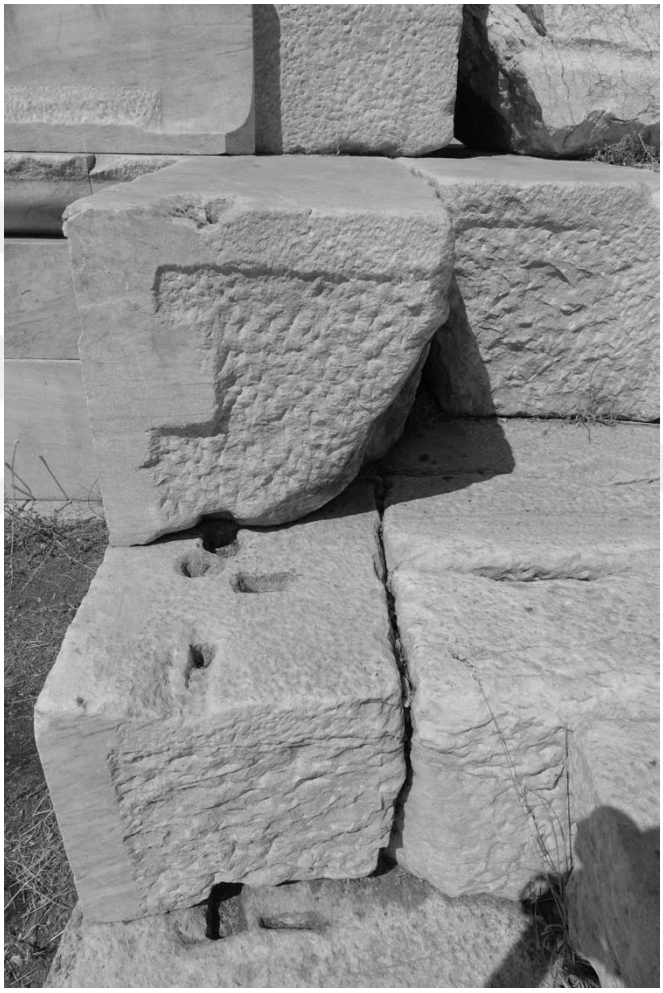


Figure 2.6: Example of *Anathyrosis* (dry stone joint construction) (URL-6).

Even though I can already outline Bötticher's theory of tectonics based on members, joints and their union; concentrating only on *Die Tektonik der Hellenen* would remain incomplete, without referring to his famous speech from 1846[5], entitled "The Principles of Hellenic and Germanic Ways of Building", which, according to

5 It is interesting to note that the speech was part of the Schinkelfest, organized in memory of Schinkel.

Frampton, exhibits “a fuller development of [his] theory” (Frampton, 1995, 83). This speech is not included here because of the lucidity of its argument (in Harry Francis Mallgrave’s terms), but rather as a theoretical reference.

In this seminal address to the members of German architectural community, not only “a new style was dawning”, but also “eclecticism would be destroyed and the source of new artistic invention would be opened” (Mallgrave, 2006b, 422). Therefore, it is possible to say that, besides resolving the specific dichotomy between neoclassicism and romanticism, Bötticher’s proposal was actually showing the way for different architectures to emerge, out of the relationship between members, joints and their unions, which were defined as the principle elements of his tectonic theory.

In his rhetoric, Bötticher, in contrast with the eclecticist approaches of the era, proposes a third style, which would resolve the stylistic impasse faced by the architectural circles in the mid-19th century:

"We have neither the ability nor the desire to return to Hellenic art, because this would mean regressing by more than two thousand years at least. But it would be equally impossible to breathe new life into Germanic art. To seek to continue with either style would mean trying to perfect perfection. Both styles have had their existence and will never exist again. And yet another art will emerge from the womb of time and will take on a life of its own: an art in which a different structural principle will sound a more ringing keynote than the other two” (Bötticher, 2006b, 422).

Nevertheless, although seeming like a onetime solution at the beginning, his proposal soon gains a universal tone: “Our contention that the manner of covering determines every style and its ultimate development is confirmed by the monuments of all styles” (Bötticher, 2006b, 422).

Bötticher, giving primacy to structure over the style (always in conjunction with his ideas on the reciprocal relationship between ontological and representational aspects of architecture), claims that the structural capacity of stone is already exhausted, and therefore, it is not possible to develop a new structural system, and accordingly, a new style (consisting of new art-forms) depending on it. As a matter of fact, he suggests that, as a new construction material, iron, with its capacity to cover wider spans, can be used to develop this new structural system and be the source of inspiration for a

new, third style, which will no more be bound by the conventional structural limitations of the stone.

Bötticher states that this new style has to be based on a "structural principle adopted from the arcuated system and transformed into a new and hitherto unknown system," while, "for the art-forms ... , the formative principle of the Hellenic style must be adopted in order to give artistic expression to the structural within the parts, their correlation, and the spatial concept" (Bötticher, 2006b, 423). Here, Bötticher demonstrates one more time how members ("parts"), joints ("correlation") and their union ("spatial concept"), form together, the tectonic character of the building. Nevertheless, it is possible to interpret this same statement, from another perspective and claim that it reflects Bötticher's desire to distinguish the core-form and the art-form, also in terms of temporality and permanence. Mitchell Schwarzer emphasizes this distinction: "As building needs change according to cultural demands and new technological and material possibilities become available, new varieties of Werkform emerge," while, "unlike the new iron Werkform, exemplifying the dynamism of industrial society, the Greek Kunstform embodies permanence, and preserves a memory of the development of earlier static relations in wood and stone" (Schwarzer, 1993, 279).[6]

Like Bötticher, it is possible to read wall's tectonic evolution, in relation with the changing structural and material, or rather, ontological realities and corresponding stylistic, representational attempts. But obviously, the objective of this thesis study is neither to propose a new style, nor to defend an existing one. By contrast, the purpose here is to analyze the wall's tectonic evolution, while remaining in the position of the observer.

2.2.2 Gottfried Semper: Tectonic - Stereotomic

Before starting to focus on the writings of Gottfried Semper, it is necessary to position him within a general cultural context and underline the important role he played in the prominence of the notion of tectonics, which continues to be a fertile line of thought

6 It is possible to relate the last part of this quotation to Gottfried Semper's emphasis on the idea of transposition.

even today. It is possible to state that, besides Bötticher, Semper can be considered as "the other great nineteenth-century theorist of tectonics" (Schwarzer, 1993, 267).

In fact, besides their common backgrounds converging on the name of Karl Friedrich Schinkel, who was a mentor for both, the parallelism between Bötticher and Semper can also be observed in their theories of tectonics. Nevertheless, even though Mitchell Schwarzer claims that Semper "derived many of his concepts on the relationship between structure and ornament from Bötticher" (Schwarzer, 1993, 267), and Semper's seminal book, *The Four Elements of Architecture*, shares some critical theoretical aspects with Bötticher's *Die Tektonik Der Hellenen* (Frampton, 1995, 84), he got to read the first volume of the latter, one year after the publication of his own book, in 1852,[7] at a time when Bötticher had already been working on the notion of tectonics for more than a decade (Schwartz, 2017, xxxviii).

One characteristic of Semper's theory of tectonics, differentiating him from Bötticher, is his rather "impartial" stance, in the face of the previously mentioned stylistic crisis of their era. Frampton relates this abstinence, to Semper's view that "an authentic style of the epoch had failed to emerge and that until such time as it did one would have to make do with the old styles as best one could" (Frampton, 1995, 89). Instead of searching for a new architectural style, which would be emerged out of the relationship between ontological and representational aspects, Semper preferred to counter the stylistic crisis, by referring to "manufacturing procedures, together with their material references and corresponding forms" (Frampton, 1995, 87).

It is possible to say that conceiving architecture as a system of relationships between manufacturing procedures and adequate materials (along with corresponding forms), was a core aspect of Semper's theoretical work, which he developed in reference to the anthropological origins of these procedures. Indeed, his anthropological approach and his desire to study "all human artifacts", instead of remaining only within the confines of architecture and the "built form", distinguished Semper's position, which "departed from contemporary convention by examining cultural work through ritual use rather than aesthetic appearance" (Schwartz, 2017, xxxviii), from the rest of the

7 It is interesting to note that, on December 13, 1852, Semper "checked out Bötticher's Die Tektonik from the library at the British Museum" (Schwartz, 2017, xxxviii), in London, where he was living in exile.

architectural circles of his era. And this distinct body of principles started to be unfolded, with his aforementioned book, *The Four Elements of Architecture*.

In the fifth chapter of that book, Semper brings forward two of his mostly known theories. As Mallgrave explains, "the first is the notion that architecture derives its essential forms from four primordial or original motives found in the technical arts of ceramics, roofing (carpentry), mounding (terracing and masonry), and weaving (walling) [referring to the aforementioned anthropological origins of the industrial arts]," while "the second is his so-called *Bekleidung* or 'dressing' thesis." (Mallgrave, 2006c, 536).

According to Semper, three of the four primordial motives, or four elements of architecture, "the roof", "the enclosure" and "the mound", are organized around the element of "hearth"[8], which can be considered as "the first and most important, the moral element of architecture," (Semper, 2006b, 537), in such a way to protect it from the hostilities coming from the outside. However, even though this primary objective remains the same, combinations and elaborations of these four elements vary, based on the context, "according to how different human societies developed under the varied influences of climate, natural surroundings, social relations, and different racial dispositions" (Semper, 2006b, 537).

8 In Oxford English Dictionary, the hearth is defined as "the part of the floor of a room where a domestic fire is made or located, typically (in modern houses) below a chimney against a wall" (URL-43) (e.g. Figure 2.7).



Figure 2.7: "Woman at a Fireside", William Henry Charles Groome (URL-7).

Another way to organize these four elements, would be to divide them into "two fundamental procedures" (Frampton, 1995, 5), or in other words, "two primordial forms of dwelling" (Hartoonian, 1994, 20): the tectonics of the frame and the stereotomics of the earthwork. Frampton further emphasizes this distinction, pointing out at the differences between, respectively, a mode of construction where "lightweight, linear components are assembled so as to encompass a spatial matrix", and another, "wherein mass and volume are conjointly formed through the repetitious piling of heavyweight elements" (Frampton, 1995, 5).

In fact, Semper's four elements "were possessed of significant etymological ramifications" (Frampton, 1995, 86), and actually, it is possible to explain the aforementioned dichotomy between tectonic and stereotomic, based on two German words used for two types of wall: *die Wand*, which was used to describe screenlike divisions and *die Mauer*, which meant fortified wall. What is interesting here, is that the former comes from the same etymological origin as *Gewand*, dress in German (Semper, 2006b, 539), and the verb *winden*, signifying to embroider (Frampton, 1995, 86).

According to Frampton, "Semper maintained that the earliest basic structural artifact was the knot (e.g. Figure 2.8), from which follows the primary nomadic building culture of the tent and its textile fabric" (1995, 86), and he was also well aware of the

relationship between the words knot and joint, which, for Semper, was the essential tectonic element.

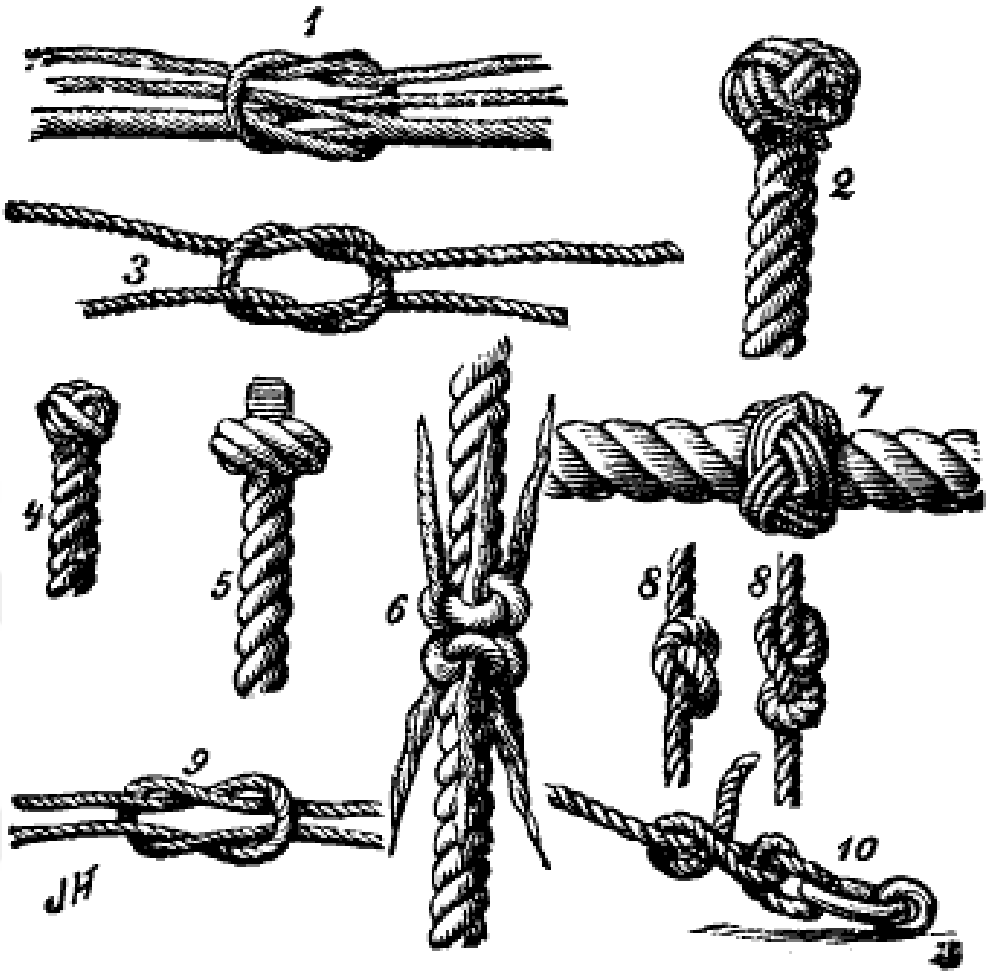


Figure 2.8: Knots from the "Nordic Family Book", a Swedish encyclopedia published between 1876 and 1993 (URL-8).

Hearth's significance among the Semperian quartet was already underlined. However, among his four elements (each possessing a corresponding technical skill), the enclosure must also be distinguished, both because of its relevance for this study, which focuses on the wall as an archetypal architectural element, but also for further detailing the dichotomy between tectonic and stereotomic.

According to Semper, "the primitive technique that evolved from the enclosure," is "the art of the wall fitter (*Wandbereiter*), that is, the weaver of mats and carpets" (Semper, 2006b, 537). Supporting his argument on the elementary, archetypal status of the carpet/wickerwork wall, in reference to its archaic and widespread use as property line, floor covering, insulation or division of space, Semper states that, in most cases, the masonry wall, "an intrusion into the domain of the wall fitter by the

mason's art, which had evolved from building terraces according to very different conditions of style" (Semper, 2006b, 537), appeared much later.

Furthermore, it is necessary to underline that, for Semper, the primacy of wickerwork, as can be seen on his drawing of the Caribbean Hut in the Great Exhibition of 1851 (Figure 2.9), which he described as "the essence of the wall", depends not only on its chronological precedence, but also on its functioning as "the true wall", "the visible boundary of space", in contrast with solid walls behind, which are only necessary for secondary reasons such as security, supporting or permanence, and which have nothing to do with the generation of space (Semper, 2006b, 537). Semper further develops this argument, by claiming that wherever the necessity for these secondary functions disappears, solid walls vanish, leaving the carpet/wickerwork wall as the sole separator of space. It is possible to read the distinction between the carpet/wickerwork wall and the solid wall, from different perspectives: as a distinction between "necessary" and "contingent", (Koolhaas & Boom, 2014, 3), "structural" and "symbolic", and indeed, between "tectonic" and "stereotomic"...

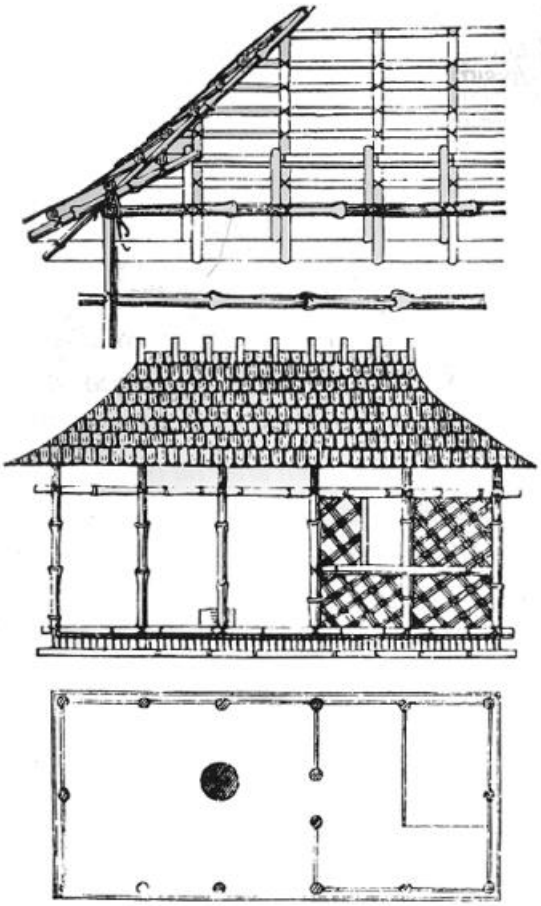


Figure 2.9: The Caribbean Hut in the Great Exhibition of 1851, Gottfried Semper (URL-9).

At this point, it is also necessary to underline that Semper's consideration of carpet/wickerwork walls as original, essential walls, does not necessarily relate to their material qualities. Since, for him, even though material changes, "either for reason of greater durability, better preservation of the inner wall, economy, the display of greater magnificence, or for any other reason" (Semper, 2006b, 538), and is replaced by clay, metal, wood, stone, and so forth, these walls keep their original, essential meanings, as dressings. In parallel with this idea of dematerialization, Harry Francis Mallgrave explains that, according to Semper's *Bekleidung* or dressing theory, "textile motive for the wall underwent an intricate process of formal development, as the conceptual rudiments of weaving evolved into textile wall hangings and later into solid wall

dressings (paneling and paint) that emulated in style their original textile origin" (Mallgrave, 2006c, 536).[9]

In order to detail the theory of dressing, another text from Semper that can be referred to, is Style in the Technical and Tectonic Arts.[10] In that comprehensive work, Semper further develops the four elements he proposed almost a decade ago. Textiles, in parallel with its significance in his thinking, covers the whole first volume, while the second volume is reserved for other three procedures: ceramics, tectonics and stereotomics. It is necessary to underline that, in the first volume, while refining his theory of *Bekleidung*, Semper refers to Bötticher, and contrasts his position towards dressing, with the latter's approach at the relationship between the core-form and the art-form.

In opposition to Bötticher's reading of the Greek temple, based on the reciprocity of structural/material realities and their representational character, Semper "emphasizes" the role that dressing plays, and defends the idea that "the Hellenic principle obviously had to be based on formal traditions that favored masking the material construction" (Semper, 2006a, 549). It is possible to claim that, according to Semper, dressing of the Greek temple, which defines the way its structural/material essence is represented, "appeared only as a carrier of the formal idea, while at the same time emancipating the latter from the building material by hiding the joints in the stone" (Semper, 2006a, 549).

Contrasting Bötticher's interpretation of the joints, based on their ability to connect adjacent members in such a way to form a static and symbolic unity, Semper underlines their hidden character, which further emphasizes the dematerialization of the Greek temple, under the influence of the solely formal dressing. In fact, according to Semper, in Hellenic architecture, "anything that had no morphological purpose, anything that was foreign or opposed to the purely formal idea, had to be excluded or removed to a neutral ground" (Semper, 2006a, 549).

In parallel with his aforementioned anthropological approach extending the limits of architecture, Semper relates the monumental art (a concretization of which is the Greek temple), to "the wish to commemorate and immortalize some religious solemn act,"

9 It is interesting to note that Semper's early work on polychromy is closely tied to his later ideas on dressings.
10 Although the first two volumes of this comprehensive work were published between 1860 and 1863 while he was living in Switzerland, Semper never managed to complete the third volume.

and states that, as it requires a refined culture "and even luxury", its essence lies in "festive celebrations" (Figure 2.10), where, "the improvised scaffold with all its splendor and frill that specifically marks the occasion for celebrating, enhances, decorates, and adorns the glorification of the feast, and is hung with tapestries, dressed with festoons and garlands, and decorated with fluttering bands and trophies" (Semper, 2006a, 550). Accordingly, as they originate from such festive activities, monuments reflect the same relationship between the dressing and the "veiled" structural framework.



Figure 2.10: Dionysian festival mixing people, fabrics, patterns and masks (URL-10).

At this point, it is necessary to deepen Semper's understanding towards the aforementioned relationship between the dressing and the inner structure, by referring to one of the footnotes from this third passage. Indeed, this can be considered as a critical motif of the Semperian theory of tectonics, which becomes even more meaningful, when compared to Bötticher's distinction between the core-form and the art-form. In this footnote, touching upon the notion of mask (always in line with his search for the anthropological origins), Semper underlines the primacy of the dressing one more time: "The destruction of reality, of the material, is necessary if form is to emerge as a meaningful symbol, as an autonomous human creation" (Semper, 2006a, 550). In fact, according to him, while masking the materiality is indispensable, it is even possible to mask the material of the mask itself, and this double masking is a characteristic of times of high artistic achievement.

Even though his notion of dematerialized dressing may seem in opposition with Bötticher's reciprocal relationship between the ontological essence and the representational character, Semper's emphasis on the truthfulness of the veiled inner

structure opens a new perspective towards his theory of tectonics. In fact, although playing an important role, according to Semper, "masking does not help when the thing behind the mask is not right or when the mask is no good" (Semper, 2006a, 551). It is even possible to deduct from this quotation, a reciprocity like Bötticher's. In parallel with the significance attributed to technical and material aspects in the latter's theory, Semper continues:

"If the material, the indispensable, is to be completely destroyed in the artistic creation ... , then the material must first be completely mastered. Only complete technical perfection, only the judicious and proper treatment of the material according to its properties, and above all only the consideration of these properties in the act of shaping form can cause the material to be forgotten, can liberate the artistic creation from it, can elevate even a simple landscape painting to become a high work of art" (Semper, 2006a, 551).

Finally, it is possible to claim that, although their positions are different, the former giving primacy to the core-form while the latter emphasizing its dressing, both Bötticher and Semper found their theories on the indispensable balance between these two.

Now that the two themes of the Semperian theory (the four elements of architecture and the notion of *Bekleidung* or dressing) are outlined and connected with each other, it is now time to investigate the role that stereotomy plays in Semper's thought. To further detail stereotomy's place for Semper, I am going to refer to Harry Francis Mallgrave, claiming that, although "the idea of architectural space for Semper had earlier resided in the walling or textile motive, ... in his discussion of stone construction [Semper] develops this theme for vaulting techniques, and, in the process of considering Roman innovations, emphasizes the importance of this 'mighty spatial art' for architecture" (Mallgrave, 2006d, 551), as exemplified with the Basilica of Maxentius in Rome (see Figure 2.11).



Figure 2.11: Basilica of Maxentius, known also as the Basilica Nova in the Roman Forum (URL-11).

It is necessary to underline that, this last part, relating stereotomy with spatiality, not only details the relationship between stereotomic and tectonic within the Semperian theory, but also opens a new perspective towards the potentials of a stereotomic architecture, which will be the concentration of the next part.

2.3 Current Debates

Following the analysis of some of the fundamental texts by Karl Bötticher and Gottfried Semper, which focus on the theory of architectural tectonics, I am going to look at more recent texts, both around the notion in question, and that investigate the current status of the wall as an architectural element. Also, for expanding the discussion in such a way to uncover the reasons behind the potential rebirth of stereotomy (along with the wall), texts from various architects and theoreticians, which refer to the matter at hand, will be included in the final part of this section.

2.3.1 Tectonics in architectural theory

Although it is important to look at fundamental texts, it is also necessary to evaluate the usage of the notion of tectonics in architectural theory, for gaining a thorough understanding of the term. This way, it will also be possible to clarify the way the notion is used in this study.

Because of its various lexical meanings and etymological origins, tectonics' use in the architectural discourse can be confusing. Kenneth Frampton's article entitled "Between Earthwork and Roofwork: Reflections on the Future of the Tectonic Form" (1998, 25-31), starts with a clarification of this challenging situation. Referring to Andrew Ballantyne's review of *Studies in Tectonic Culture*, Frampton lists five different usages of the term tectonic, as Ballantyne determined in his own texts. These usages are: "building construction artistically considered", "light tensile skeleton frame" (considering the term's etymological origin tecton, as carpenter), "a more general usage", or rather, an umbrella term which also covers "the category of 'stereotomic'", "adjectival use [...] referring to the manner of working and joining the material in question" such as "metal tectonic" or "wooden tectonic", and finally, "atectonic [...] as a way of deliberately mannered opposing principle in which the structural logic of a work is suppressed" (Frampton, 1998, 25).

Based on the usages listed by Frampton, along with meanings and etymological origins mentioned at the definitions part, it is now possible to concretize the way the notion of tectonics is used in the literature. Nevertheless, before doing so, it is also necessary to focus on a neighboring term: technology. It is important to underline the distinction between these two terms, for clarifying the reason why the second lexical meaning in the dictionary mentioned previously, compensating tectonics only with building and construction, seems reductive.

In his book entitled *Ontology of Construction* (1994), Gevork Hartoonian claims that "as the logos of making", techne, "in the classical concept of work, did not signify a means, but the unity of means and end" (Hartoonian, 1994, 11). In a way, techne, as a kind of knowledge, covered both the process and the object to be produced. Nevertheless, with the classical thought losing its importance, "a shift from interest in 'what' to 'how' - that is, from object to process" (Hartoonian, 1994, 13), resulted in the dominance of the process over the object, or rather, of technology over techne. In a way, for technology, what matters is the process, while for tectonics, as "techne of carpentry", the knowledge of building, both the process of building and the building itself as an object are important.

It is possible to further emphasize the distinction between the notions of tectonics and technology, by referring to the notions of "necessity" and "freedom", as coined by Demetri Porphyrios (Porphyrios, 2002, 133). According to Porphyrios, tectonics lies

in the middle of these two terms, while technology's interest remains only on the side of what is useful and necessary.

However, it is not always easy to draw such an exact line between tectonics and technology, especially when the latter is put into a broader perspective. For instance, according to Heidegger, defining technology merely in terms of usefulness and necessity would not be enough for addressing the term's essence. In his seminal article entitled "The Question Concerning Technology", Heidegger claims that the general tendency towards technology is to consider it from an "instrumental" and "anthropological" perspective. Nevertheless, even though such a definition of technology, considering it as "a means [instrumental] and a human activity [anthropological]" (Heidegger, 1977, 5) seems "correct", it does not establish "a free relationship with that which concerns us from out of its essence" (Heidegger, 1977, 6).

In order to establish such a relationship, Heidegger deciphers technology step-by-step and constructs his argument by gathering the notion's various attributes, which, although seemingly unrelated, get all connected in the end. Attributes such as "challenging", "revealing", "setting-upon", "ordering" and "enframing" broaden technology as a notion, in such a way to make it exceed the limitations of its instrumental and anthropological definition. Eventually, in parallel with tectonics, technology "becomes" something more than its lexical meaning.

Although it gains new attributes, Heideggerian technology is still different than the way the notion of tectonics is used in this study. In fact, it is possible to say that, here, tectonics is closer to the way Heidegger uses techne, rather than technology. According to Heidegger, technology used to be called techne; nevertheless, back then, techne was covering a wider spectrum of life:

"There was a time when it was not technology alone that bore the name techne. Once that revealing that brings forth truth into the splendor of radiant appearing also was called techne. Once there was a time when the bringing-forth of the true into the beautiful was called techne. And the poiesis [making] of the fine arts also was called techne" (Heidegger, 1977, 34).

It is possible to state that, in this study, the term tectonics, as "the techne of carpentry", the knowledge of building, is between "the true" and "the beautiful", as coined by Heidegger.

Another reference to be made will be to Dalibor Vesely, who, like Heidegger, also focuses on the issue of technology and brings it within the context of architecture. In his article entitled "Architecture and the Question of Technology", Vesely explains that the aforementioned duality between "necessity" and "freedom", between "true" and "beautiful", or with his terms, between "the merit of technical efficiency" and "that of aesthetics", became "a process of homogenization", which resulted in the dominance of technical aspects: "There is a strong feeling that the multitudinous traditional ways of making and creativity are slowly being absorbed into one dominant way of making and thinking" (Vesely, 2023, 30).

It is possible to say that, remaining within the context of tectonics, allows to break free from this unidirectional thinking, which tends to bring forth the "necessity" over "freedom" in architecture. As a matter of fact, looking at the "technological" evolution of an architectural element such as wall, would not necessarily mean to work as a technical evaluation. As Vesely states in the last paragraph of his article: "Only when we take into account the reality that is not directly affected by technology [...] can we understand the true nature of the so-called 'technological world'" (Vesely, 2023, 46).

According to Heidegger "the essence of technology is nothing technological" and therefore, "essential reflection upon technology and decisive coming to terms with it must happen in a realm that is, on the one hand, akin to the essence of technology, and on the other, fundamentally different from it. Such a realm is art" (Heidegger, 1977, 43). As previously mentioned, techne, is where both art and technology were born of: it is their "common ground" (Vesely, 2023, 32). It is possible to say that, tectonics sits on that common ground, evacuated by earlier forms of artistic and technical realms.

Finally, based on the aforementioned juxtaposition of the meanings and origins, its use in various texts and in comparison with technology, it is possible to draw a picture of the term tectonics in the architectural discourse. Tectonics, as the "techne of carpentry", the knowledge of building, is the in-between of process and object, necessity and freedom, true and beautiful, construction and construct, or rather, the way the construction is represented. It is actually this balanced, suspenseful position, which makes tectonics a perpetually fertile theoretical ground, which was brought

forward as a critical line of thought by the architectural circles of the 19th century Germany, and continues to play an important role within contemporary architectural theory.

2.3.2 The wall's ontological crisis

"Walls have always been destined to disappear. What many considered to be the most basic element of architecture was not going to last, and once this fact was recognized and assimilated into architectural culture, it became the subject matter of the wall." (Forty, 2013, 12-13).

As mentioned previously, the second section Current Debates will be focusing on the wall's actual status as a fundamental architectural element. As Siegert explains in Graz Architecture Magazine's 9th Issue, entitled "Walls: Spatial Sequences", "the utopia of Modern Architecture [following the steps of the previous century], at least when it is self-reflective as in the case of authorial architecture, appears to be an architecture that has left the wall behind -or, phrased gingerly, an architecture that liberated the wall from its cultural-technical functions and anthropological points of reference" (Siegert, 2013, 19). In fact, and ironically, emancipated from its structural and material duties (and from another perspective, "limitations"), wall had also become "redundant". In other words, after all the years of tectonic evolution, which will be the topic of the following chapter, reclaiming its freedom from its ontological duties (its capacity as a structural and/or dividing archetypal architectural element) was also the cause of the wall's demise. In fact, Eugène-Emmanuel Viollet-le-Duc's" prophecy", extracted from his commentary on the late Gothic architecture, an example of which can be seen in Figure 2.12, about "the death of the wall" (Forty, 2013, 13), was finally realized.

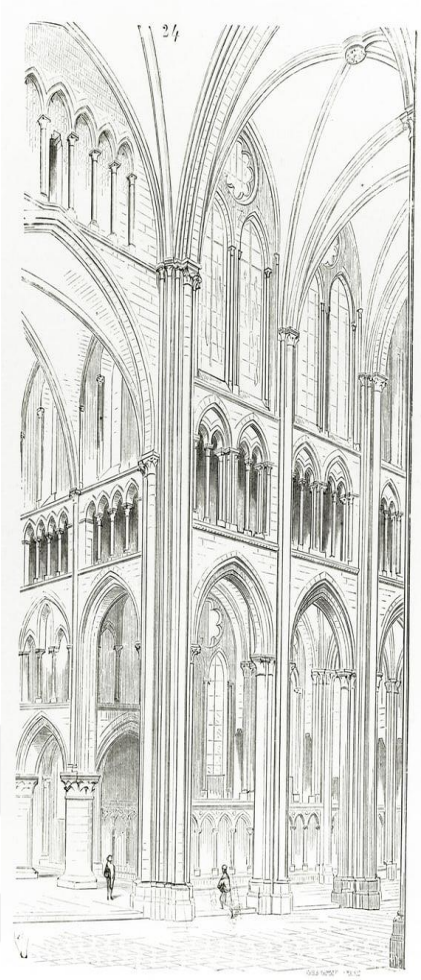


Figure 2.12: "Interior of Cluny Cathedral", Eugène-Emmanuel Viollet-le-Duc (URL-12).

It is possible to claim that the wall's dissolution, which can be considered as its ontological crisis, was the desired result of the efforts of the architects since the turn of the century. "Countless examples between then and now could be cited to support the theory that the architecture of the twentieth and twenty-first centuries has been obsessed with the idea of the wall being de- or re-functionalized, deconstructed, or completely eliminated in the most varied of ways" (Siegert, 2013, 20), in so far as, it is now possible to talk about a "postparietal architecture", an architecture which left the wall behind, as mentioned before.

In fact, independent from the way they use the wall, all architects maintain a position towards this architectural element, since, "even its utter dematerialization serves to distinguish the design by the absence of this central element -the now nonexistent wall, in a material sense, lends architectural credence and becomes more important than even before!" (Riewe, 2013, 4). In that case, it is possible to say that even its demise

cannot be considered as the wall's categorical elimination, but rather, a design choice. According to Adrian Forty, "for every architect, the wall could no longer be a neutral 'given' of a building, but had become something towards which they had to take up a position: no matter how an architect treats a wall, it becomes a statement about their relation to the past, the present, and the future;" in fact, "every leading architect produced their own commentary on the problem" (Forty, 2013, 14).

In parallel with the current debates around the notion of tectonics, it is possible to discern various "commentaries", threads within contemporary architectural discourse, aiming at countering the wall's dissolution, or, in Roger Riewe's terms, at its "renegotiation as [a feature] inherent to architecture" (Riewe, 2013, 3). Although Riewe mentions two of these, as "an approach focused on achieving a topological repositioning founded on a perspective of tectonics" and "one intending to undertake a technological exploration of the wall's functions, likewise from a tectonic perspective" (Riewe, 2013, 14), it is possible to define a third alternative, based on the idea of returning to/re-interpreting stereotomy, as will be explained in the next part.

Out of these three threads, the first one to be outlined in this study, is the "technological exploration of the wall, from a tectonic perspective", which aims at reconfiguring the traditional wall -already emancipated from its structural and dividing roles- as an agglomeration of various technological functions. By attributing each of these functions to a different "layer", this approach converts this archetypal architectural element as a multi-layered entity. It disintegrates the wall into its different functions, such as structure, thermal insulation, fire resistance, rain-screen, and so forth, in contrast to the traditional approach, combining all these aspects within the substance of one "thick" layer. Even though the objective of this study is not to go into the technical details of the wall construction; at this point, it is suitable to concretize and illustrate the way this idea of "layering" works, as such.

In the fifth volume of the Scale series by Birkhäuser, consisting of works touching on different building elements, entitled Enclose/Build: Walls, Facade, Roof (Reichel & Schultz, 2015), "the move away from solid building components with a large mass towards high-performance filigree elements" is said to be "[leading] to greater freedom with respect to construction and conceptual design", and therefore, "solutions can be tailored closely to each brief" (Reichel & Schultz, 2015, 30). On such a wall, each layer, consisting of a distinct filigree entity, might have a specific role, and "the wall"

can be considered as the hierarchical superposition of these various layers (e.g. Figure 2.13).

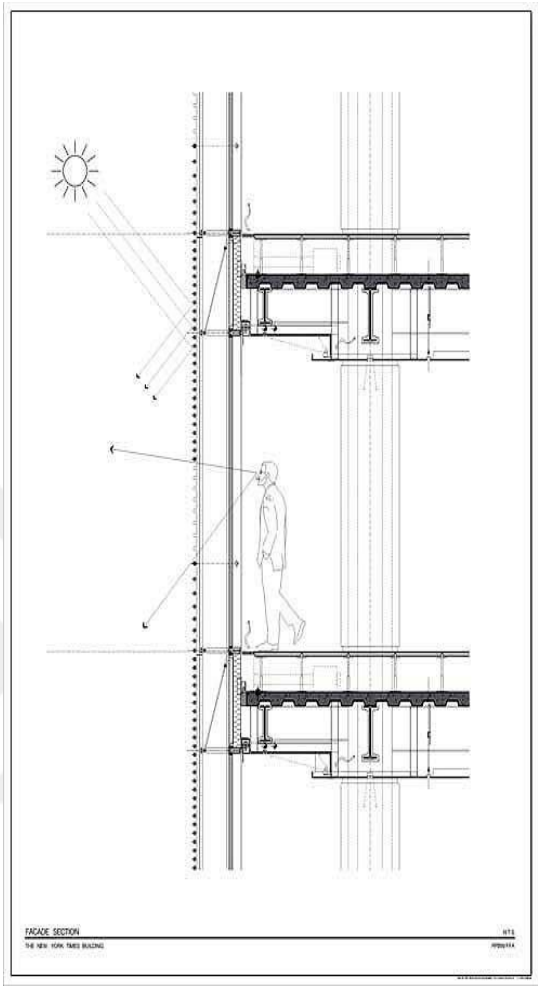


Figure 2.13: Facade detail of the New York Times Building, Renzo Piano Building Workshop (URL-13).

Nevertheless, although it provides a functional precision, disintegrating the wall into its functional constituents, can be interpreted as another way to give primacy to tectonic, over the stereotomic, considering the former's fragmental nature, against the latter's tendency to work as a conglomerate. It is possible to say that this approach, instead of solving the wall's ontological crisis, might further strengthen its representationality. In fact, Forty's commentary on this process of disintegration supports this point: "But what if wall surfaces could stop referring to structure altogether, and be dedicated solely to their exclusively 'architectural' function, that of signification? If all the functions … could be taken care of elsewhere [on other layers], and the wall deal only with the last function on his list, "appearance", what might then

a wall become?" (Forty, 2013, 17) Disintegrated from its ontological essence, and working only as a layer of signification, in other words, as a surface of representation, is it still possible to talk about the wall as a fundamental architectural element?

The second thread within contemporary architecture runs parallel with the desire to replace the tectonic with the topologic. Instead of conceiving the wall as part of the dichotomy between the tectonic and the stereotomic, or thinking of it as a union between members connected with each other through their joints (in parallel with Karl Bötticher's thought), or even as a dressing which masks the structural and material essence lying behind (this time in parallel with Gottfried Semper's thought), this approach leads the way to reconsider this element in terms of topology.

Nevertheless, before expanding on this concept's reflections on the field of architecture (see Figure 2.14) and on the wall as an architectural element, it is necessary to look at the term's lexical meaning. In the Oxford English Dictionary, "topology" is defined as "the way in which constituent parts are interrelated or arranged" and "a branch of mathematics which studies topological spaces using the tools of abstract algebra" (URL-46). As a term belonging to mathematics, it consists of those spatial properties which remain unchanged, even when they are deformed in different ways, by stretching, bending, extruding, folding and so forth. Moreover, considering that "topology helps to understand space in terms of … invariance under transformation" and "surface in topology is called a two-dimensional-manifold", it is possible to claim that "topologically homogeneous (equivalent) surfaces may be very different in shape" (Teyssot, 2013, 85).

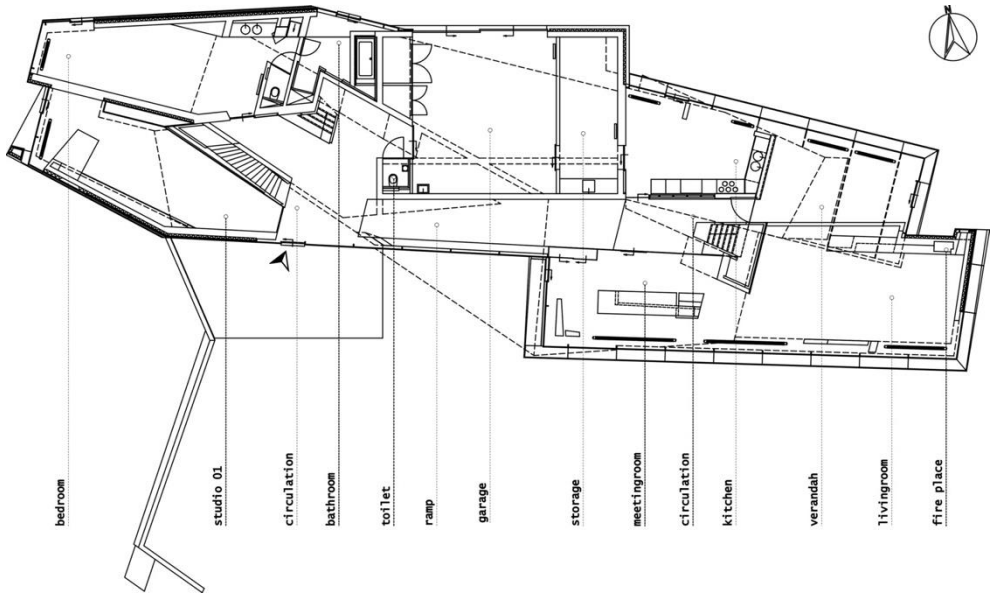


Figure 2.14: Floor plan of the Moebius House, designed by UN Studio, in reference to Möbius strip, which is an abstract topological space (URL-14).

Behaving according to the rules different than the ones belonging to the Cartesian geometry, topology has the potential to open the doors for a new kind of architecture. In his article "Blobs (or Why Tectonics Is Square and Topology Is Groovy)" (1996, 58-61), Greg Lynn underlines the distinction between "Cartesianism", which "is associated with the isolation and reduction of systems to their constitutive identities" and "[a] combinatorial universe … founded on the changes in identity that take place with greater degrees of complexity and connection" (Lynn, 1996, 59).

In fact, based on such a perspective, it is even possible to redefine the wall itself. Instead of conceiving of it as an isolated, separate entity, would it be possible to think of it as a deformation, an "extrusion" of the ground surface? How would it be to reformulate the conventional relationship between the ground and the wall, based on the disconnectedness of these two entities, where the latter is standing still on the former, as a connected, or rather, continuous topological surface? "Does the wall establish a kind of fold in the ground … ?" (Ingold, 2015, 30) Tim Ingold concludes the sixth chapter of *The Life of Lines* (2015), entitled "Wall", with this last question and he adds: "How come that the wall is both raised upon the ground and yet partakes of it?" (Ingold, 2015, 34). According to him, as a fold in the ground, the wall's distinction is "unilateral". In other words, although it distinguishes itself from the ground, it is still part of it.

Considered as such, it is clear that the topological approach provides an intellectually fertile ground for countering the wall's ontological crisis. However, it is also necessary to underline its deficiencies, which can be grouped into two: firstly, the risk of oversimplification that the "direct" application of such a concept might have, and secondly, similar to the former thread, ontological essence's potential subordination to representational character, which becomes the sole objective of the architectural design, and the potential "commodification" (in Kenneth Frampton's words) that such a situation can cause in both of the threads.

While developing his ideas on topology and the way it can be applied to architectural thinking, Greg Lynn refers to Gilles Deleuze's concept of the fold, which, itself, is an extension of Gottfried Wilhelm Leibniz's mathematics. In his preface to Bernard Cache's seminal book *Earth Moves: The Furnishing of Territories* (1998), Michael Speaks underlines that, besides his concept of the fold, Deleuze's distinction between "the realization of the possible" and "the actualization of the virtual" is critical, especially in terms of questioning this former's applicability in architectural design (Speaks, 1995, xiv-xv).

According to this distinction, while "[the former] operates by the principles of limitation and resemblance", "[the latter does so] by differentiation, divergence, and creation" (Speaks, 1995, xiv-xv). In other words, in the first case, out of all the potential possibles, only one is selected (limitation) to become realized. Moreover, since there is no difference between the possible and the real (resemblance), which is just a representation, a figuration of one of the possibles, there is nothing to be discovered, nothing new. By contrast, "in order to be actualized, the virtual cannot proceed by elimination or limitation, but must create its own lines of actualization in positive acts" (Deleuze, 1988, 97). Also, the actual does not resemble its virtual, but rather, differentiates from it.

Considering this distinction, it is now possible to question the applicability of the concept of the fold in architectural design and look at the way it can be used to counter the wall's ontological crisis. In search of a "new architecture", Michael Speaks asks: "Does 'the fold 'contribute to the production of new forms of architecture, or does it simply repeat what already exists?" (Speaks, 1998, xv). In fact, a direct application of the concept of the fold in architectural design, in other words, "realization" of a "possibility" of folding (in reference to Gilles Deleuze's terminology), limits the

role(s) that the former can play. Since it is based on the "resemblance" and there is no gap between the idea and its realization, such a direct translation does not allow to produce a "new architecture".

Indeed, same is the case for a "new wall" as an architectural element. Reinterpreted as a "folded", "plied" or "supple" plane, based only on a formal understanding, wall does not necessarily gain its ontological essence back. By contrast, as will be explained later, in relation to the second type of deficiencies, such an understanding ends in the subordination of the ontological essence to the representational character, eventually. Therefore, it seems necessary to consider the concept of the fold not as a form-finding tool, translating the possible into the real, but as a passage from the virtual to the actual. In fact, although he uses a mostly formalistic language in his article, even Greg Lynn emphasizes the "informal" character of the concept of the fold and concludes his article[11] accordingly:

"If the collected projects within this publication do have certain formal affinities, it is as a result of a folding out of formalism into a world of external influences. Rather than speak of the forms of folding autonomously, it is important to maintain a logic rather than a style of curvilinearity. The formal affinities of these projects result from their pliancy and ability to deform in response to particular contingencies" (Lynn, 2013a, 43).

The idea of a direct translation from a possibility of folding into a constructed reality, is also countered by Anthony Vidler, who further details the deficiencies of such an application, in reference to a selection of Lynn's works, besides others. In his article Skin and Bones: Folded Forms from Leibniz to Lynn (2000, 219-233), where he investigates the concept of the fold, Vidler explains:

"In Deleuze's terms, as derived from an exceedingly original reading of Leibniz, the fold is at once abstract, disseminated as a trait of all matter, and specific, embodied in objects and spaces; immaterial, and elusive in its capacities to join and divide at the same time, and physical and formal in its ability to produce shapes, and especially curved and involuted shapes. This last characteristic has been of special interest to architects. Always searching for the tangible attribute of an abstract thought; but it is

11 Lynn's article in question, is the keynote essay in *AD* Profile 102, entitled Folding in Architecture, collecting a group of projects and essays which reflect the "new architecture" of the era.

not at all clear that folds, in the sense of folded forms, correspond in any way to Deleuze's concept, or even less to Leibniz's model" (Vidler, 2000, 219).

According to Vidler, attributing a form to the concept of the fold (transformation of possible into real) is problematic; since the fold refers not only to "a crease in a piece of cloth", but also to the void covered by, or around the cloth: in fact, "the matter … is everywhere" (Vidler, 2000, 219). In other words, from this perspective, what is being folded is not only the material/solid, but also the immaterial/void. Indeed, it is possible to further detail this argument, based on Vidler's comparative reading of Deleuze and Leibniz; nevertheless, within the confines of this study, it will be more suitable to focus on the impacts this concept has on the relationship between ontology and representation and its potential to counter the wall's ontological crisis.

Vidler states that a new generation of architects, taking advantage of digital modeling and drawing techniques, and inspired by the ideas of Deleuze and Cache, aimed at developing "a new alliance between spatial theory and biotectonics [or rather, topology]" (Vidler, 2000, 226). It is possible to count Greg Lynn among this group of architects "searching for a formal method", who, according to Vidler, were influenced by "admittedly somewhat literalized versions of Deleuze's theory of the 'fold' in philosophic discourse" (Vidler, 2000, 227). One of the most renowned examples of Lynn's works is his Embryological House, shown in Figure 2.15.

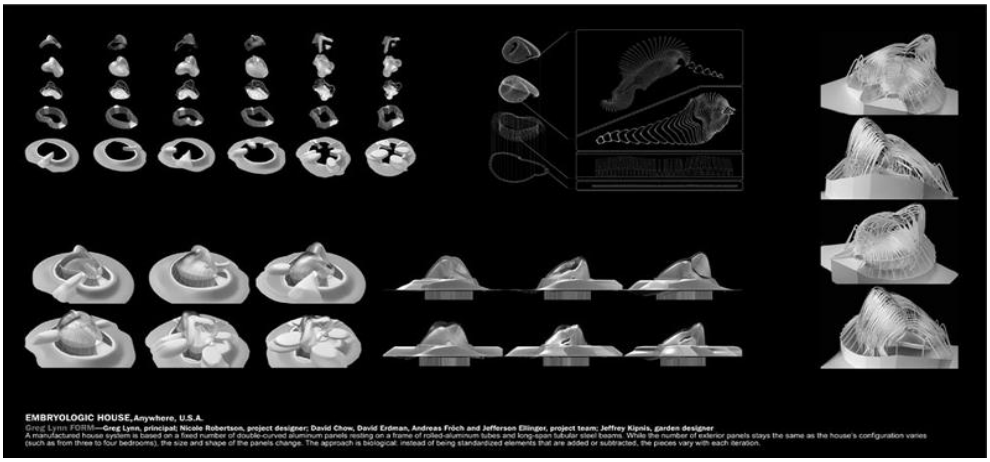


Figure 2.15: Greg Lynn's Embryological House (URL15).

In fact, despite the inventiveness of his practice, based on "an open-ended set of mathematical/topological experiments that disturb if not replace the formal paradigms of postmodernism" (Vidler, 2000, 227), Lynn's applications fall under the category of formalism, with its blobs, folds and curves... Nevertheless, it is necessary to underline

that, although obtaining formalistic results, Lynn's ideas can be considered as a theoretical challenge to his predecessors.

In his article "Architectural Curvilinearity: The Folded, the Pliant and the Supple" (2013b, 30-62), Lynn proposes "a continuous yet heterogeneous system", "a smooth, pliant mixture" as an alternative to the "unity" and "contradiction", two options which became dominant "in response to architecture's discovery of complex, disparate, differentiated and heterogeneous cultural and formal contexts" (Lynn, 2013b, 30-62), since the 1970s. In fact, it is this theoretical challenge, differentiating Lynn's architectural practice, rather than his literal applications of the fold, based on a direct translation from possible to real.

Fundamentally, this final statement runs parallel with Michael Speaks's argument on the importance of the architectural practice itself. According to Speaks, architectural forms do not matter, however, forms of architectural practices do so: "It is in the shaping of the form of practices (including techniques and logics), rather than the shaping of individual architectural forms, that the concept of the fold becomes important for the development of new architectural form" (Speaks, 1998, xvi). Therefore, it is possible to conclude that, although formalist, Lynn's stance -besides others- based on a "topological" approach, is a suitable reference in terms of its methodological inventiveness, which could lead the way for breaking free from the wall's current ontological crisis. With the help of the concept of the fold, and specifically, by "folding" not the wall itself, but the understanding of the wall, "a new wall" can be developed.

Finally, it is possible to state that this second thread within contemporary architecture, which was outlined here as a "topological" approach based on the concept of the fold, provides a fertile ground for countering the wall's ontological crisis. Nevertheless, it is also necessary to emphasize that, as mentioned previously in reference to the dichotomy between possible/real and virtual/actual, although working at a theoretical, methodological level, it is difficult to "formalize" the concept without avoiding a direct translation, which inevitably falls within the domain of the pure representation. Therefore, referring to the fold with the aim to reinterpret, reinvent the practice, and not the form, seems more suitable.

According to Michael Speaks, this reinterpretation of the practice itself, is the key to obtain a new architectural form, hence, a new wall:

"Thus new forms of architecture will not emerge as a result of the effects achieved by ever more pliant, fluid, complex, and heterogeneous shapes or architectural forms, but rather with the development of more pliant, complex, and heterogeneous forms of architectural practice-architectural practices supple enough to be formed by what is outside or external to them, yet resilient enough to retain their coherence as architecture" (Speaks, 1995, xvi).

Based on Speaks's suggestion, it is possible to claim that the practice of architecture should be reconfigured, in such a way to internalize what is outside of itself. In that case, considering the proposal of this thesis study, which is presented as a re-interpretation to stereotomy for countering the wall's ontological crisis, it is relevant to ask how it would be possible to relate the stereotomic approach with the folding of the practice. However, this will be the topic of the next part.

Since I already outlined the first deficiency of the topological approach as its potential reductiveness and suggested an alternative approach based on the reconfiguration of the architectural practice (instead of the architectural form), by referring to Anthony Vidler and Michael Speaks, I will now bring forth the second inconvenience that was mentioned previously: subordinance to representation and eventual commodification. In fact, this second deficiency, which is also shared by the first thread, defined above as disintegration, or layering of the wall, can also be considered as a consequence of the direct translation of the concept of folding into an architectural form.

Form obtained this way, runs the risk of ending up working as a tool of representation. And as already explained, it is not possible to expect from a wall formation based on the literal application of the movement of folding, to reclaim its structural, material essence. To further detail the reasons behind the subordinance to representational character and an eventual commodification, it is possible to refer to Hal Foster's Design and Crime and Other Diatribes (2002), and certainly to his reading of Frank Gehry's projects (especially the ones he conceived after the 90s, which can be considered as examples "topologically" produced), in parallel with sculptor Carl Andre's description of art.[12]

12 It is also necessary to note that Foster underlines the impact that the sculptor had on the architect, by referring to the former as "Minimalist sculptor of the kind said to have influenced Gehry" (Foster, 2002, 36).

In a 1970 radio interview, Andre attempts to reformulate art in three phases, based on the relationship between structure and skin -in reference to this thesis study's lexicon, the dichotomy between ontology and representation- of the Statue of Liberty (see Figure 2.16), from the perspective of artists from different eras. According to him, artists were first interested in the "bronze sheathing", the skin of the statue. With time, this interest shifted first towards the inner structure (underlying the skin), and then to the site, the Liberty Island itself (Foster, 2002, 36-37). It is possible to say that, besides the centrality it attributes to the skin and structure relationship, which runs parallel with the tectonic discourse, Andre's narrative is also interesting, considering its role as a reference point for Hal Foster who tries to position Gehry's architecture, relative to artists' shifting interests.

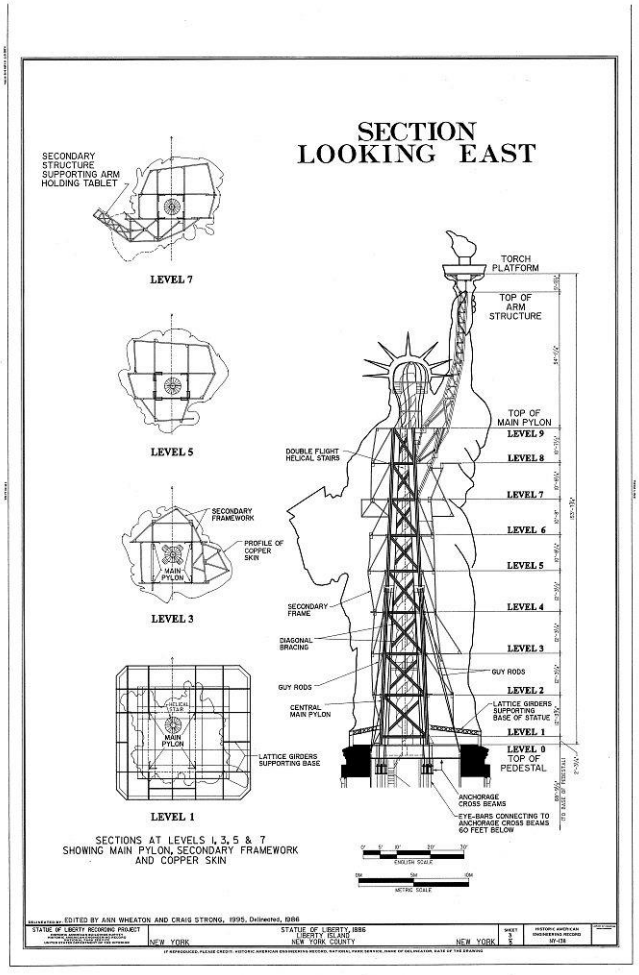


Figure 2.16: Statue of Liberty's section (looking east) and plans from different levels (URL-16).

According to Foster, the latter, seen by many as "our great artist, or at least our great sculpture" (Foster, 2002, 36), represents a "time-loop" within Carl Andre's history:

"… considered as sculpture, the recent Gehry buildings appear regressive, for they reverse the history of the medium sketched above [in reference to Andre]. For all the apparent futurism of CATIA designs, these structures are akin to the Statue of Liberty, with a separate skin hung over a hidden armature, and with exterior surfaces that rarely match up with interior spaces. (This comparison might not be fair to the Statue of Liberty, for it involves an innovative interplay between structure and skin [an emphasis reminding Gottfried Semper's description of mask, which was mentioned in the Literature Review], whereas Gehry allows his skin to dominate structure)" (Foster, 2002, 37).

From this perspective, it is possible to see how a direct translation of the concept of the fold, ends up giving primacy only to the representative qualities, while undermining the ontological, structural, material essence, despite the innovative architectural look. At Gehry's Bilbao Museum (Figure 2.17), exterior walls consisting the skin of the building, differ from Semperian masks, because of the "falsity" of their underlying structures; since, as mentioned previously, "by 'masking' Semper did not intend falsehood, but rather the creation of a tectonic veil through which and by which it would be possible to perceive the spiritual significance of the structural form, as it lay suspended, as it were, between the pragmatic world of fact and the symbolic world of value" (Frampton, 2005, 151).

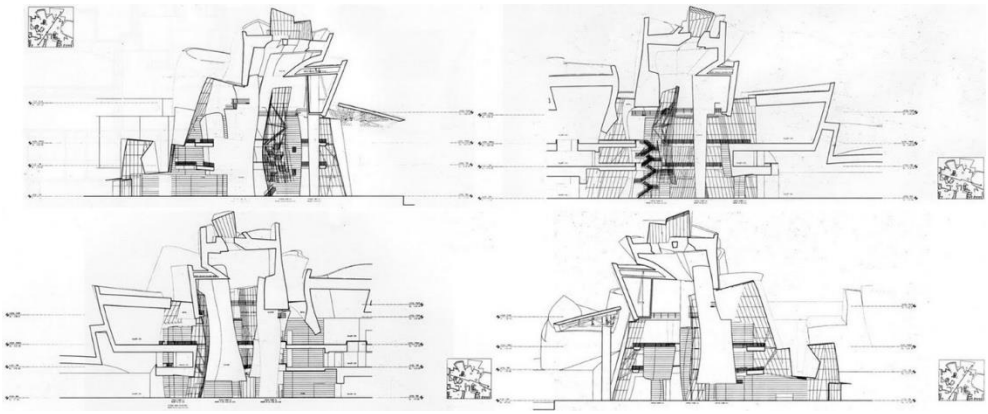


Figure 2.17: Sections from The Guggenheim Museum Bilbao (URL-17).

Nevertheless, this does not mean to stamp all architectural forms based on a topological approach, as pure representations. Considering the ones generated through the application of the concept of the fold into the practice itself, which, instead of searching for folded forms, folds the methodology (such is also the case of Prefectura Gymnasium by Shoei Yoh seen in Figure 2.18), an example that Greg Lynn refers to

in Folding in Architecture), it is possible to create ontological essences out of the concept of the fold.

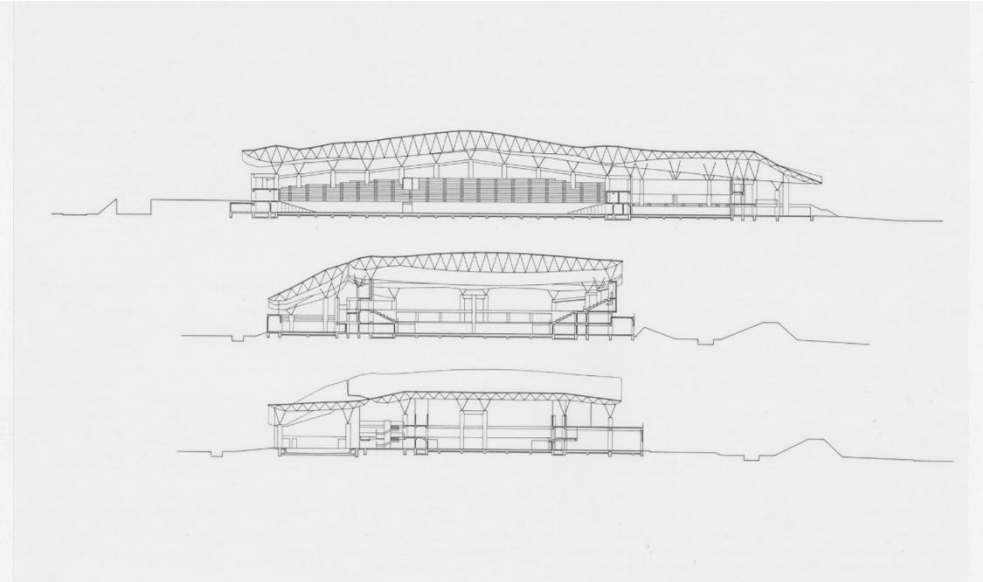


Figure 2.18: Sections from the Prefectura Gymnasium (URL-18).

Indeed, dominance of the representational character, which can either be the cause of an attempt to layer (the first thread), or fold the wall (the second thread), is generally followed by an eventual process of commodification. At this point, it is necessary to underline that, in this thesis study, discussion on the wall's ontological crisis is led within the confines of the tectonic discourse. However, to further detail the crisis in question, it is important to look beyond the notion of tectonics and to outline the ongoing tendency towards the spectacular.

As mentioned previously, multi-layered, or topological approaches based on the concept of the fold can result in purely formalistic results, where representational character dominates. However, although the ontological crisis explained in terms of ontology's subordinance to representation reached a climax point in recent years, it is possible to trace this tendency back, even to Gottfried Semper. In a recent interview, Frampton asserts that "there was a fundamental opposition between the tectonic and the scenographic in architecture, where the tectonic is the fundamental autonomy of the structure, and the scenographic is the representational aspect of the image" and continues: "Semper's model of the four elements grows out of an anthropological paradigm, but he also expresses an ambivalence to the scenographic aspect of the mask or *Bekleidung*. The scenographic, theatrical aspect was crucial to him" (McQuillan, 2016, 2).

Therefore, although its roots can be traced back to Semper's writings, who emphasized the role that the scenographic, the representative played in architecture throughout his intellectual career with his *Bekleidung*, or dressing theory; it is necessary to differentiate today's process of perpetual commodification, which lies in the total dominance of the "spectacular image" (McQuillan, 2016, 2), from the Semperian mask. In a relatively recent article, Gevork Hartoonian further emphasizes the exceptionality that we are currently experiencing: "Today, the situation has changed dramatically: the commodification of everyday life is total and the subjective world of artists and architects is constantly defined and redefined by an everydayness saturated with visual images" (Hartoonian, 2009, 77).

Considering the dialogical relationship between the tectonic and the scenographic mentioned by Frampton; today, defending a tectonic position, developing a tectonic discourse[13], can also be seen as a way to counter the aforementioned process of commodification, accompanied by the subordinance to representational character, which dominates the current architectural scene.

2.3.3 Attempts towards a stereotomic approach

"In a cave, the floor is the earth itself: but then so are the walls and so is the roof. To inhabit a cave is to live in the earth, not on it, and to draw nourishment from it just as do the plants that grow in the vicinity and the animals that roam there, perhaps joining with humans in taking advantage of the shelter that the cave affords. From the mouth of the cave, as from our eyes, we see the world itself, not a picture of it" (Ingold, 2015, 42).

Since I already outlined the wall's ontological crisis and described two of the current threads, "layering" and "folding", which tend to lead to the dominance of representational character, one might ask how, as a third way, a return to, or rather, re-interpretation of stereotomy can help to reclaim the wall. Indeed, it is not possible to think of stereotomy as an isolated thread, which was suddenly reborn, or rather, rose like a phoenix from the ashes of the tectonic discourse, after hundreds of years of a gradual fall, which ended in its total dissolution, along with the wall as an architectural element itself. Although it differentiates from the other two threads, stereotomy can

13 Indeed, here, the term "tectonic" refers to the knowledge of building.

be explained in reference to them; since, besides opposing some of their aspects, it also shares some others.

Fundamentally, emergence of contemporary stereotomy can't be considered as an isolated architectural thread and should be evaluated as part of a wider cultural paradigm shift. Therefore, referring to this cultural background and differentiating stereotomy from other contemporary architectural tendencies -defined in the previous part as "layering" and "folding"- will be helpful.

Indeed, there is a recent interest in the geological as a source of inspiration, accompanied by the ongoing process of digitalization. It is possible to say that the necessity to fulfill the expectations of the contemporary daily life, while also facing current ecological and urban challenges, moreover, the desire to develop a language between building and city scales, triggered this tendency towards the geological. Nevertheless, without the process of digitalization, it would be harder, and even impossible to translate this theoretical background into stereotomic realizations at various scales.

In parallel with contemporary geologization and digitalization processes, stereotomy is re-emerging today as an old but new architectural approach. In fact, with its intrinsic features, it can be considered as an alternative way of designing and building walls, in such a way to counter this fundamental architectural element's ontological crisis, mentioned in the previous section.

Indeed, it is possible to claim that today, there is a tendency to make use of the stereotomic architecture, the symptoms of which can be seen both in various theoretical works and stereotomic realizations at different scales. However, as defined in the introduction, there is a huge gap between these latter and the long tradition of tectonic theory -which I attempted to cover within the confines of this study- and it is actually this theoretical gap that this thesis study aims to fill in. In this manner, I hope to contextualize a contemporary stereotomic approach, which would counter the wall's ontological crisis, leading to this element's dissolution.

It is possible to state that the return in question follows two trajectories, which will be addressed in this dissertation as "geologization" and "digitalization". However, it is necessary to underline that, although they touch on different aspects of the stereotomy, these categories must be considered as parts of a mutual relationship, running parallel

to each other. In fact, it is not possible to draw a clear picture of the process of geologization, without taking current developments in digital modelling and fabrication techniques into consideration. It would be much harder to propose stereotomy as an alternative way to counter the wall's ontological crisis, without contemporary digital tools.

Nevertheless, before going into the details of the relationship between contemporary digital tools, it is necessary to talk about the emergence of a new "geological" approach (as Stan Allen calls it) and position the current fascination with stereotomy within a larger context. In fact, being the one to conceptualize various contemporary attempts blurring the boundaries between architecture and landscape, and between architecture and city, Stan Allen has an important role.

By referring to geology as a source of inspiration (and using the opportunities provided by contemporary digital tools), architectural theory and practice attempt to fulfill the spatial and programmatic expectations of the changing society, while also facing current ecological and urban challenges. "Geology", defined in the Oxford English Dictionary as "the branch of science concerned with the physical structure and substance of the earth, the processes which act on these, and the earth's development…" (URL-42) -slow processes such as rock formations, erosions, accumulations, tectonic shifts and so forth- provides a good reference source for architects, with its balanced position between nature's unsparing demand for "change", countered constantly by the "resistance" of Earth's strata (e.g. Figure 2.19).

Struggling with both contemporary daily life's dynamism and growing environmental problems, this in-between position stands out as a new architectural solution, which becomes concretized with buildings merging stability and movement, architecture and landscape, artificial and natural... According to Stan Allen, "the proliferation of buildings that create new terrain through the folding and creasing of surfaces, or the piling up of blocks to create artificial peaks in the urban context, signals a desire to treat urban space as geological matter and to blur the boundary between nature and culture" (Allen, 2008b, 76).

In accordance with this desire to remain in-between, in the first article included in *Landform*[14] *Buildings: Architecture's New Terrain* (Allen & McQuade, 2008), a seminal book collecting various texts and projects around the notion of geology, which he co-edited with Marc McQuade, Stan Allen underlines that "the current appeal to nature is to something hard and durable, a fixed landmark capable of resisting change in an urban environment constantly in flux" (Allen, 2008b, 76). Indeed, "hard" and "durable" geological formations, which resist the rapidity of the contemporary daily life, differ from the "more lifelike, that is to say, more fluid, adaptable" (Allen, 2008a, 20), in other words, "biological" applications -as in the case of Gehry's and Lynn's works mentioned in the previous part- which imitate nature's constant transformation.



Figure 2.19: Rock formations in Cappadocia (URL-19).

Therefore, it is necessary to underline that, even though they both refer to nature and use digital technologies of modeling and fabrication, and despite their formal references to the concept of the fold (as can be seen in various projects and realizations), this new tendency towards the geological is different from its biological neighbor. Instead of running parallel to contemporary daily life, it aims to work as its scenery, its infrastructure, its ground. In fact, an artificial ground, a new nature... Allen

14 As part of the contemporary architectural discourse on geology, Stan Allen coins the term "landform building". According to Allen, this latter positions itself between architecture and landscape. By way of merging the artificial and the natural, playing with sectional relationships, dissolving the boundaries between inside and outside, it develops new spatial and programmatic solutions and concretizes the way geological approach can work especially at the building scale.

further emphasizes this difference, by referring to the varying speeds of evolution in geological and biological systems:

"Arising out of similar ambitions, [instead of looking] to the biology of individual species, [this new trend looks] to the collective behavior of ecological systems as a model for cities, buildings, and landscapes. Landscapes change and evolve, and they, too, are shaped by force and resistance working over time. But the rate of change in a landscape or an ecological system is far slower than that of an individual living body" (Allen, 2008a, 20).

Besides blurring the boundaries between architecture and landscape (or artificial and natural from a broader perspective), in such a way to find a balance between different expectations of contemporary daily life and growing environmental problems, it is also possible to interpret this recent tendency towards the geological, as a result of the desire to find an in-between position, linking architecture with the city, or rather, with the geography. In fact, based on such an interpretation, it is possible to say that the return to geology gives the architects the ability to work at various scales simultaneously, to conceive of their buildings as formations belonging to the urban geology, or in Sarkis's words, to "aspire" for the "larger scale" (Sarkis, 2017, 101).

At this point, it is also important to underline that, this second interpretation is rather critical in terms of its ability to relate the geological approach with the tectonic discourse elaborated throughout this dissertation, as will be exemplified with the help of Kenneth Frampton's "megaforms", Hashim Sarkis's "megaliths" and Gevork Hartoonian's "monoliths". The aforementioned inter-scalar aspect creates an opportunity to give primacy to the stereotomic over the tectonic, rather than just a new urbanistic understanding.

As one of the leading figures to translate the tectonic discourse of the 19th century into a topic of discussion within contemporary architectural theory, Kenneth Frampton is also critical in terms of his contribution to the literature on the aforementioned "geological" understanding. His notion of "megaform" is one of the critical concepts to evoke the urbanistic potentials of a "topographic" architecture, which would

positively affect the way the "megalopolis"[15], this "space-endless", "sub-urbanized form of limitless land settlement" (Frampton, 2008, 238), operates.

In his article Megaform as Urban Landscape (Frampton, 2008, 238-249), Frampton explains that megaform gives primacy to "the overall form" and adds that "what is much more pertinent [for it] is the topographic, horizontal thrust of its overall profile ..." (Frampton, 2008, 238), in opposition to the megastructure -which can be characterized with its emphasis on the structure. It is possible to interpret this differentiation in terms of the dialogical relationship between the tectonic and the stereotomic and reformulate it as the opposition between the assembled megastructure and the heaped, piled megaform.

After analyzing a series of megaform examples, ranging from Alvar Aalto's Baker Dorm at the MIT campus in Cambridge, Massachusetts (Figure 2.20), to Foreign Office Architects' Yokohama Ferry Terminal, Frampton concludes his seminal article with a short manifesto. There, he remarks that "within the space-endlessness of the megalopolis, a megaform may also serve as a kind of a landmark feature, like a geological outcrop ..." (Frampton, 2008, 248). Almost like a rock, a heap, a hill, or a mountain standing in the middle of the city, it is possible to state that, megaform as defined by Frampton points at the return of the stereotomy, although at an urban scale.



Figure 2.20: Baker Dorm at the MIT campus in Cambridge, Massachusetts (URL-20).

15 Frampton specifically refers to the notion of "megalopolis", in order to differentiate "the metropolitan city of the 19th century", from "the urbanized region of the 20th century" (Frampton, 2008, 238).

In parallel with Kenneth Frampton, Hashim Sarkis also touches on the current tendency towards the geological. In his short essay entitled For a Tectonic of Megaliths (Sarkis, 2017, 101), Sarkis addresses the current interest in "megaliths", and considers these archaic constructions (e.g. Figure 2.21) as signs of a new stereotomic architecture: "the larger scale aspirations of contemporary architecture, the new technologies available to us, and the increasing references to geology and geography have begun to evoke a stereotomy that is closer to the megalithic" (Sarkis, 2017, 101).

Sarkis's essay aims to relate two seemingly disparate terms: "Tectonic" and "megalith". According to him, megaliths are establishing a tectonic connection between building and urban scales (in parallel with "megaforms" as defined by Kenneth Frampton), while also forming a new, stereotomic language. From this perspective, although it can be defined as "the stone structure that is farthest from the possibility of a tectonic" (Sarkis, 2017, 101), megalith gains a tectonic character, without being subordinate to a tectonic understanding.



Figure 2.21: Poulnabrone Dolmen in Ireland (URL-21).

Based on this argumentation, Sarkis differentiates the use of megaliths, from other architectural attempts which consider stereotomy "as a source of inspiration for compositional or geometric relations" (Sarkis, 2017, 101), or from the ones conceived

deliberately as "a-tectonic"[16] (like the "biological" cases mentioned previously), which end up operating tectonically, contrary to their appearance:

"Even if several formal explorations of contemporary architecture may appear to be a-tectonic, whether in aspiring for surface continuities or for monolithic effects, the built outcome does constantly reaffirm the hegemony of the tectonic over architecture. As aggregated or geometrically derived its surfaces seem to be, or as mute its forms become in relation the weight of their mass, these buildings still defer to some frame or envelope logic [reminding two of the Semperian elements of architecture: 'roof '(as a product of carpentry) and 'enclosure']. After all, their success is measured by how long they delay revealing the tectonic, by how well they feign homogeneity, and how elegantly they wrap complexity with simplicity [like the Semperian 'mask']" (Sarkis, 2017, 101).

In terms of the current tendency towards the geological, the final reference to be made is to Gevork Hartoonian's relatively recent article, Theatrical Tectonics: The Mediating Agent for a Contesting Practice (Hartoonian, 2009, 77-96), which was already mentioned in the previous part. It is possible to say that, in this article, Hartoonian "further details" the stereotomic language Hashim Sarkis attributed to megaliths, while commenting on two recent projects, based on a re-reading of Brutalist architecture: Zaha Hadid Architects' Phaeno Science Center in Wolfsburg (Figure 2.22) and OMA's Casa da Musica in Porto (Figure 2.24). According to Hartoonian, these two can be considered among those projects which "intermingle geometry with sculptural tectonics", "whilst geometry is central to image-laden drawings produced by digital machines" (Hartoonian, 2009, 92).

Hartoonian claims that Brutalism gave the architects of the 1950s the opportunity to differentiate their works from the early Modern Architecture, through a "transformation of the architectural image ... from a painterly to a sculptural tectonics" (Hartoonian, 2009, 78), or, in other words, "to rethink the tectonic in association with sculpted forms" (Hartoonian, 2009, 84). Nevertheless, it is possible to state that, with its unique features including "sensibility to material, construction, and the tectonic of

16 According to Chad Schwartz, "a-tectonic" has two potential definitions: "designing architecture without using tectonic principles or without following tectonic thinking outright" and "architecture that purposefully exaggerates or distorts the tectonic expression" (Schwartz, 2017, Ixii). As an example of the former case, Frampton refers to Adolf Loos's *Raumplan*, which "could never be expressed in tectonic terms" (Frampton, 1995, 18).

heaviness", and, with its "aspiration for monolithic massing", Brutalism creates also an alternative "to the current architectural tendencies for abstract and digitally-charged playful forms" (Hartoonian, 2009, 84), considered from a contemporary perspective.

Hartoonian states that, with its Brutalist tendency, Phaeno Science Center's architecture, differentiating from Hadid's earlier works, has a "stereotomic-looking architecture" which "purports a dynamic image" (Hartoonian, 2009, 90). Looking like a monolith floating on a buried ground from a distance (see Figure 2.22), Hadid's building also carries various stereotomic details at close range, which further strengthen its dynamic form. In fact, it is possible to say that, with the help of these details -"pleats" and "cuts" in Hartoonian's words- Hadid develops an inter-scalar language, which represents -to repeat what has already been said- both a monolith and a pile of cut-stones at the same time.



Figure 2.22: Phaeno Science Center looking like a monolith floating on a buried ground (URL-22).

Pleats work at the monolithic scale, breaking the orthogonality of the whole volume, which starts to look like a rock found in nature. By contrast, cuts are more effective at the "smaller" scale and used to refine the surfaces of that volume. At this point, it is necessary to mention the distinction Hartoonian makes (in reference to Robin Evans's book, *The Projective Cast*), between two types of line "in the drawings used for stonecutting": "one light and the other heavy, 'the imaginary lines of geometrical construction and the lines indicating contours of the thing drawn'" (Hartoonian, 2009, 92). In parallel with this distinction, "cuts" on Phaeno Science Center's facades have different attributes. Besides defining the edges of the windows, they follow the traces

of formwork, while also creating a diamond-shaped pattern throughout the building, in such a way to remind a stereotomic construction (Figure 2.23).



Figure 2.23: "Cuts" and "pleats" on the Phaeno Science Center's facade (URL-23).

The other example analyzed by Hartoonian is OMA's Casa da Musica, which, according to him, looks "as if it has been tossed into its territory like a stone" (Hartoonian, 2009, 92), as can be seen in Figure 2.24. Like Phaeno Science Center, the building's monolithic volume is further articulated with the help of "stereotomic cuts", primary and secondary lines wrapping the volume: "the two major ones being those that charge the building with directionality, [which] parallel the orientation of the building with the city" and "the secondary cuts ... introduced to support the suggested orientation, which happens to follow the spatial organization of the building" (Hartoonian, 2009, 92). In fact, with the help of these stereotomic cuts, the building gains a sculptural quality, which allows it to differentiate itself from digitally produced, image-laden examples.



Figure 2.24: Casa da Musica as a massive stone on the urban landscape (URL-24).

Besides further detailing the stereotomic language of monoliths, Hartoonian's article is also critical in terms of its emphasis on the role that such an architecture can play in the age of perpetual commodification. In fact, as explained in the chapter concentrating on the wall's ontological crisis, the current tendency towards the commodification, also results in the representational character's dominance over the structural, material essence of the building. However, as Hartoonian explains at the end of his article, "the tectonic [as the knowledge of building] has the capacity to reach for a perception of surface that neither is calculated to the limits of load-bearing forces ... , nor tallies with the skin dressing of the organic forms produced by digital means" (Hartoonian, 2009, 93). In this manner, with its pleats and cuts, stereotomic language helps architecture to redefine itself as a sculptural, tectonic discipline, standing in balance between ontology and representation.

As explained at the beginning of this part, theoretical works leading the way towards the return of the stereotomy follow two parallel trajectories: "geologization" and "digitalization". Among these two, if we consider the former group as more related with the formation of stereotomy's theoretical background, the latter can be said to consist of works which rather concentrate on various methodologies of a contemporary

stereotomic architecture. Since I already outlined the ongoing tendency towards the geological, I can continue with a review of the works establishing a connection between current digital modelling and fabrication techniques and the archaic knowledge of stereotomy.

According to Giuseppe Fallacara, who is the coordinator of the New Fundamentals Research Group[17], "we are in the wake of the discontinued weave of the stereotomic culture" (Fallacara, 2009), and if today, there is a possibility to return to stereotomy - after all these years of disappearance from the architectural scene- it is mostly caused by the ongoing process of digitalization: "Once a slow and painstaking process of cutting each stone by hand, now stone masonry can proceed rapidly with computer-guided cutters that can fashion more complex shapes than a person working manually with hand-held tools. And computer graphics enable architects to explore sophisticated forms ..." (Fallacara, 2009).

In his article entitled "Toward a Stereotomic Design: Experimental Constructions and Didactic Experiences" (Fallacara, 2009), Fallacara establishes a relationship between stereotomy and topology, and aims to study vaulted spaces based on that. According to him, topology can open new possibilities for stereotomic design and fabrication (e.g. Figure 2.25):

"Whereas, from the perspective of topology, there is no difference between a plane or a cylinder, in stereotomy the stones will have different shapes in each of these and other forms. In classical stereotomy, the determination of the exact angles between the surfaces of various vaults and domes constituted a problem to be resolved. For topological stereotomy on the computer, the determination of the angles is resolved automatically as a consequence of the deformation of the initial shape. Through a virtual deformation, each ashlar of a vault is a numerical entity whose value is transferred automatically to the cutter" (Fallacara, 2009).

17 "New Fundamentals Research Group is a team of Italian architects and academics coordinated by Giuseppe Fallacara. The team is affiliated to the Department of Civil Engineering and Architecture (DICAR) of the Polytechnic of Bari, and develops research projects which deal with the relationship between innovation and tradition in architecture" (URL-38).

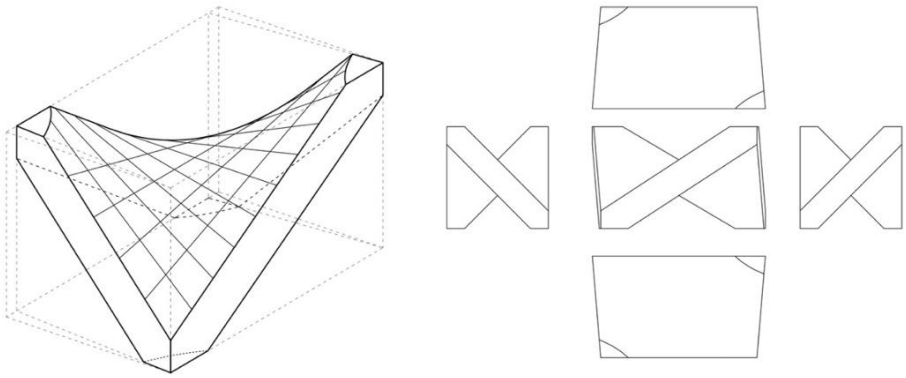


Figure 2.25: Unit geometry of the stone vault prototype by the New Fundamentals Group, cut from a French limestone block with the help of a wire used by a robotic arm (URL-25).

According to Fallacara, another advantage of the digitalized stereotomy lies in the incorporation of different kinds of knowledge, into the geometric model. In opposition to the current tendency to disintegrate formal, structural, mechanical, or other aspects of construction, with the help of "the syncretic nature of the computerized processes", it is now possible to conceive of a "unified" geometric model, as was the case in historical stereotomic examples (e.g. Figure 2.26), where "the disciplinary knowledge" was already united (Fallacara, 2009). In fact, this last statement can also be discussed within the confines of the tectonic discourse elaborated in the previous parts, considering tectonics' emphasis on the merging of structural, material essence, and the way this is represented.

Fallacara's last statement concentrates on the issue of mass-customization, which he describes as the "serial uniqueness of the manufactured article" (Fallacara, 2009). With the help of the parametrization of the digital stereotomic model, not only each block can be differentiated according to its location, the structural role it plays, or its desired form, but also the project as a whole can be replicable but unique at the same time.



Figure 2.26: Philibert de l'Orme's trompe design carrying the gallery above, without touching the Bullioud Hotel's courtyard, constitutes an elaborate example of classical stereotomy (URL-26).

The issue of parametrization is also addressed by Andréa Régis and Carla Marzo, in their article "Stereotomic Design: The Use of Stone in Contemporary Architecture" (Régis & Marzo, 2018). According to them, from the combination of digital fabrication and parametric design, along with the recent tendency to build with stone, emerges the notion of "digital stereotomy", which relates "traditional stone construction" with "new ways of production" (Régis & Marzo, 2018). In parallel with Fallacara, Régis and Marzo also underline the unifying aspect of the digitalized stereotomy: "Parametrization helps architects and designers to construct with stone, because it helps in processes of structural calculations, material necessities and construction process" (Régis & Marzo, 2018). Consequently, as mentioned previously, it is possible to say that digitalization helps to conceive of an "integrative" stereotomy; by extension, a stereotomic architecture associating structural and material aspects with their formal and representative counterparts.

As part of the ongoing "digitalization" accompanying the re-emergence of the stereotomy, the final reference will be to Brandon Clifford, an architect and researcher from MIT. In his recently published book, *The Cannibal's Notebook: Mining Myths of Cyclopean Constructions* (Clifford, 2017), Clifford develops an argument on the "necessity" to return to a stereotomic architecture, by way of re-using, (or in his terms, "cannibalizing") the debris from constructions and demolitions, with the help of digital scanning and fabrication methods. The book is organized in three chapters, concentrating consecutively on the current situation of the cities and the construction industry, on the traditional techniques of stone construction used by various civilizations, and finally, on the potentials of a new stereotomic architecture.

Clifford tries to translate prehistoric and historic large-scale masonry techniques into a contemporary stereotomic design language. However, instead of stone, he proposes to use debris and rubbles as this new stereotomy's construction material. In this manner, he aims to find a solution to the crisis he describes in the first part of his book, which, according to him, is caused by the ever-increasing construction rate and massive urbanization all around the world.

While describing his method, Clifford refers to the notion of "adaptive customization", which is based on the idea "to make online corrections to the geometry of future components to adapt to deviations between a master digital model and a constantly updated as-built condition". In fact, according to him, the relationship between design and fabrication is not linear, but rather bidirectional, "whereby the overall design can adjust to results or in progress changes to the as built system" (Clifford, 2017, 102). Consequently, in parallel with manual stereotomic realizations, where the mason has to adapt each piece he positions according to the actual status of the construction, such a process allows to scan the existing condition and to re-adapt the design accordingly.

At this point, since the two trajectories -defined here as "geologization" and "digitalization"- paving the way towards a contemporary stereotomic architecture are already outlined, it is now necessary to define the theoretical boundaries of this dissertation:

Although they draw a picture of the current interest in the "geological" -starting to become concretized through "megaforms", "megaliths" and "monoliths"- and despite their remarks on the emergence of a stereotomic architecture (along with its details such as cuts and pleats), texts belonging to the first trajectory do not provide a tangible

connection between the old but pertinent tectonic discourse and the stereotomy as an alternative to counter the wall's ontological crisis. These texts do not observe the impacts of the emerging stereotomy at the building scale, but rather concentrate on the "larger scale", on the relationship between architecture and urbanism, and even between architecture and nature.

As for the texts belonging to the second group, it is possible say that they are rather interested in developing various methodologies for a contemporary stereotomic architecture, which do not necessarily relate with the tectonic discourse. As a matter of fact, even though they are specific in the way they describe their techniques, and thus provide some clear insights for an argumentation on the potentials of a new stereotomic wall, these texts have to be recontextualized in such a way to propose an alternative stereotomic approach countering the wall's ontological crisis.

Finally, as mentioned at the beginning of this part, it is possible to state that there is a gap between the wider cultural paradigm shift defined here as "geologization", contemporary stereotomic realizations based on the ongoing process of "digitalization", and the tectonic discourse. It is precisely at this interval, that this dissertation aims to be located. It is hoped that this positioning will both solidify the theoretical background of the current interest in stereotomy and help to reclaim the wall as a fundamental architectural element, while also maintaining the authenticity of this study.

3. WALL: A TECTONIC EVOLUTION

"... A structure of near universal distribution, but which in some ways confounds the distinction between stereotomics and tectonics: namely the wall. Is the wall assembled or woven? Is it heaped or joined? Is it of the earth or of the air?" (Ingold, 2015, 28)

It is possible to describe the wall's tectonic evolution, as this archetypal architectural element's "oscillating" movement between the poles of ontological core-form and representational art-form. Nevertheless, as will be illustrated with the help of historical cases, with the rising dominance of the tectonic wall over its stereotomic counterpart, in accordance with the primacy Semper gives to it, the aforementioned oscillation lost its balance, and the role that stereotomy plays has been gradually diminished. Furthermore, in parallel with the rise of the tectonic wall, the reciprocal relationship between the wall's ontology and representation has been broken, as the balance has been disrupted to the advantage of the latter.

Consequently, wall's ontological crisis can be considered as the disruption of this oscillating movement (between the poles of ontological essence and representational character, and under the influence of their opposite but reciprocal forces of attraction), which loses its balance and gets finally "out of the way". In order to illustrate the way the wall's ontological crisis developed, it is suitable to look at how this element tectonically evolved and reached at that crisis situation.

Indeed, there are many ways of discussing the wall's evolution throughout history. Likewise, depending on the context in which it is treated, wall's crisis can be looked at from different perspectives. For instance, in the book entitled *Elements of Architecture: Wall* (Koolhaas & Boom, 2014)[18], the story of this archetypal architectural element, is conceived as a multi-faceted narrative, based on a non-hierarchical and non-chronological superposition of the structural/material reality of different wall types and the paralleling socio-cultural changes witnessed by the society.

18 2nd volume of the series Elements, accompanying the 2014 Venice Architecture Biennale curated by Rem Koolhaas.

There, defined as “the vanishing divide”, wall is said to be witnessing a process of “demise”, which started “with the discovery of flexibility”: “The time-lapse fluctuation of our societal floor plan has accelerated. Now you can almost watch the walls go up and down in real time” (Koolhaas & Boom, 2014, 3-4).

Eventually, the flexibility in question, which is tied to the rapidity of the contemporary daily life, results in a kind of perpetual redundancy of the wall, to be either replaced, reconfigured or totally demised. Within a cyclical process, the old is constantly replaced by the new, becoming inevitably a “waste”. Although the aim of this thesis study is not to develop an argument around matters of sustainability, this desire to flexibility, resulting in an uncontrollable amount of waste has to be mentioned. In his recently published book, *The Cannibal’s Cookbook: Mining Myths of Cyclopean Constructions* (Clifford, 2017), Brandon Clifford underlines the deficiencies of our current approach towards the act of building:

“Existing structures are destroyed, and debris is summarily removed [to be used as infill at some other location]. The urban site is treated as a tabula rasa, with existing buildings as undesired marks to be erased. [...] Old buildings are flattened, new ones erected, and the waste inadequately reappropriated” (Clifford, 2017, 45).

In fact, although this may sound pretentious, it is possible to claim that, becoming more and more tectonic, flexible, filigree, and losing its ontological essence, its structural and material reality, wall becomes redundant and eventually turns into waste. In that case, it is critical to underline that the crisis in question consists of many layers which are not independent, but rather, interrelated; and it is possible to consider it as a kind of palimpsest.

However, considering the scope of this thesis study, it is necessary to keep the discussion within the confines of the tectonic discourse. In order to illustrate the wall’s tectonic evolution, walls belonging to specifically selected examples will be analyzed in accordance with the theoretical model that will be defined in the next part, based on the theoretical framework, and more specifically, readings from Karl Bötticher and Gottfried Semper.

3.1 Theoretical Model

As explained in the definitions part, tectonics's essence lies in its in-between position between the construction and the way it is represented. As the knowledge of building, it is neither solely technological, or rather, constructional, nor representational. As for Bötticher and Semper, it is possible to claim that, although their tendencies to give primacy to ontology or representation vary, both underline the relationship between the structural/material essence of built forms and the way these are represented. However, Semper's thought has some additional aspects, consisting of the division between his four elements and the idea of *Bekleidung* or dressing.

In Bötticher's case, the relationship between the ontological core-form and the representational art-form of a built form, forms the essence of the tectonic idea. It is important to underline that, for Bötticher, this relationship is founded at several scales: at the scale of the members, of the joints between those members, and the built form as a whole. In other words, it is possible to reframe Bötticher's approach, as a multi-scalar core-form / art-form, ontology / representation relationship.

As for Semper, although the indispensability of both ontological and representational aspects for each built form remains the same, it is possible to claim that the structural and material core-form and the representational art-form seem much more disconnected.

In fact, his *Bekleidung* or dressing theory explains the disconnection between the ontological essence and the representational essence according to Semper. Dressing, emancipated from the structural and material realities, defines a new kind of wall, where ontological essence of the built form is hidden behind its representational aspects. However, although it seems to have a secondary position, it is necessary to underline that Semper insists on the truthfulness, on the technical correctness of this structural and material essence.

Based on Semper's four elements of architecture (the roof, the hearth, the mound and the enclosure), we can distinguish two types of construction: the tectonic of the frame and the stereotomy of the earthwork. In reference to his emphasis on the primacy of the textiles (as infill walls) combined with the tectonic of the frame, and his comments on the subservience of the stereotomic walls in comparison with the essentiality and

originality of their tectonic counterparts, I can say that Semper's ideas established a critical theoretical background, confronting the tectonic and the stereotomic.

In order to shape our theoretical model, I am going to try to merge two different aspects of Bötticher's and Semper's theories of tectonics, in other words, the two dichotomies they suggest: ontology / representation and tectonic / stereotomic. By placing these dichotomies on two axes (X and Y) and juxtapose them, I obtain a coordinate system (Figure 3.1):

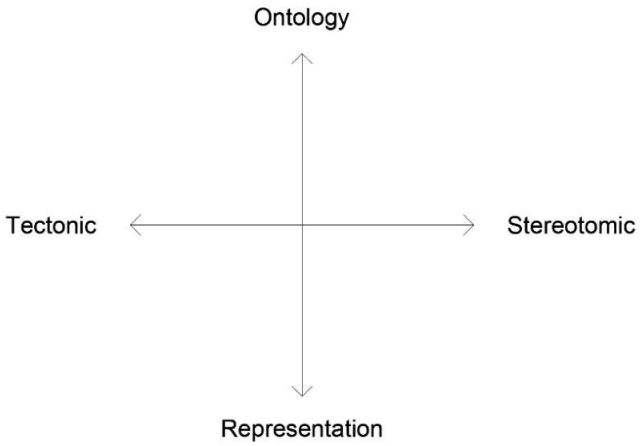


Figure 3.1: Coordinate System Diagram.

Based on this coordinate system, it is possible to claim that there is a dialogical relationship between the wall's ontological / representational character and its tectonic / stereotomic behavior.

With wall's ontology, I mean its two archetypal qualities, defined in the theoretical framework: its capacity as a structural and/or a dividing element. Indeed, these two qualities do not need to be each other's alternative. A wall can be both structural and dividing, or, neither structural nor dividing.

What is meant with the adjective "dividing", is the wall's ability to "divide" (or unify) the space in terms of movement and sight. Although it is possible to add other domains of perception, I will limit myself with sight; since the intention here, is not to conduct

a phenomenological discussion, but rather to talk about the wall's opacity and/or transparency.

It is possible to conclude that the more the wall becomes tectonic, the more its structural capacity is transported from its surface, to additional linear elements (sticks, bars, ropes, columns, and so forth), which are either assembled or entangled. The process of losing the structural capacity can also be accompanied by a process of becoming transparent and permeable (although there are opposite cases).

Consequently, it is possible to claim that the wall's tectonization may result in its potential demise as a structural and/or dividing architectural element. "Purified" from its archetypal qualities, this "new" wall is then reduced to a means of representation. A wall, free from its ontological burdens, which is there only to represent...

Even though the description of this "new" wall sounds rather negative, it is necessary to clarify that here, the aim is not to write a prescription for a "better" wall or to take a stand and classify "good" and "bad" walls. As mentioned at the very beginning of this study, the purpose here is to observe how this archetypal architectural element evolved until now, through various phases, and to underline its rather intense transformation which occurred in the last century, resulting in what I call its "ontological crisis".

3.2 Fragments of History

With the help of thematic examples from history, I will attempt to analyze the wall's tectonic evolution, leading to the said ontological crisis. To do so, I will refer to the theoretical model explained above and look at the wall's capacity to work as a structural and/or dividing architectural element, in each of the selected cases. This way, I am going to obtain a collection of wall examples which would help me weigh my hypothesis and investigate how the wall's "tectonization" and "stereotomification" affects its ontology as an archetypal architectural element.

While selecting the thematic wall examples, I will look at different fragments from this architectural element's history of tectonic evolution. I intend to find an evolution that can be represented with a time series graph, showing a kind of equilibrium between the wall's tectonic and stereotomic behaviours, an equilibrium that is disrupted with the dominance of the former, over the latter.

Here, the wall's tectonic evolution is analyzed in five steps: "The Cave and the Hut", "The Greek Temple", "The Renaissance Palace", "The Modern House" and "The Stereotomy Re-Interpreted". As suggested by the titles corresponding to each of these steps, the evolution in question will be addressed in a chronological way. A chronology starting from two archetypal wall types (that are also referred in Semper's four elements) and reaching to three contemporary and innovative wall experiments, relying on stereotomic principles.

It is necessary to underline that here, selected fragments correspond to changes in the wall's tectonic behavior. Nevertheless, these changes are not necessarily limited with the cases selected for this study. In fact, it is possible to say that the more there are fragments, the more the time series graph showing the wall's tectonic evolution can get refined. In other words, the increase in the number of fragments can enhance the graph's accuracy. However, as will be seen in each of the cases, I tried to focus on the ones that represent radical shifts in this fundamental architectural element's tectonic behavior, shifts that also have reflections in architectural theory.

The changes in question are expressed in terms of the wall's functioning as a load-bearing and/or dividing architectural element. To be more precise, I can say that I will try to understand if the wall maintains its ontological functions, or transfers them to other architectural entities. For instance, in terms of load-bearing, the wall either maintains its full capacity, or shares it with columns (fully or partially). As for division, it either takes full responsibility (becoming a barrier against movement and/or vision), or shares it with other layers such as curtains, fences, reflective films, and so forth. I claim that, the more the wall becomes tectonic, the more it is freed from these ontological functions.

Following the analysis of the fragments of the wall's tectonic evolution, I will start to transfer my findings on a series of coordinate system diagrams, which will be the focus of the next chapter. Finally, the data taken from these diagrams will be transferred to the time series graph I mentioned before, in such a way to illustrate the wall's tectonic evolution.

3.2.1 The Cave and the Hut

In this study, the first phase within wall's evolution will be addressed as a double-faceted case, in such a way to include both of the fundamental methods of building:

“tectonics of the frame” and “stereotomics of the earthwork”, as defined by Kenneth Frampton. In contrast with the following phases, each comprising a specific case, this dichotomy is purposefully maintained for laying the foundations of the discussion to be led throughout the chapter.

In the first chapter of his comprehensive work, entitled The Story of Architecture (1983), Patrick Nuttgens states that:

“Throughout the whole of history until our own century (which has revolutionized technological developments, [...]) there have been only two ways of building: you could either put one block upon another or you could make a frame or skeleton and cover it with a skin” (Nuttgens, 1983, 9-16).

Although there is an extremely wide range of wall types -each with different characteristics- it can be said that this archetypal architectural element’s entire evolution can be read in reference to these two opposing (and sometimes overlapping) building methods. Nevertheless, the purpose is not to look at antecedent cases from the perspective of a historian; nor to list all these types in an encyclopedic manner, but rather to analyze specific examples with the help of the theoretical model explained in the previous part. This way, it would be possible to concretize the way the wall “started” to be used as a spatial tool, either as a structural or a dividing (or both) architectural element.

According to Alberto Campo Baeza, the fundamental distinction between stereotomy and tectonics can be defined as such: “[the first] is the architecture of the podium, the plinth, the stylobate. It is, in short, the architecture of the CAVE”, while “[the latter] is the architecture of the shell, of the abacus. It is, in short, the architecture of the HUT” (Campo Baeza, 1996). Baeza supports his argument with various architectural designs, such as the Rotonda House (Figure 3.2). In parallel with Campo Baeza, it is then logical to go back to the basics and focus on these two primordial types.



Figure 3.2: Alberto Campo Baeza's Rotonda House as the culmination of "a podium" and "an abacus" (URL-27).

Indeed, the term "cave" that is borrowed from Campo Baeza and used as the title of this section (along with "hut" as its counterpart), should not limit the stereotomic examples that will be evaluated in this chapter. As I explained under the definitions part, stereotomy is an operation of carving and/or piling up of solid materials. In fact, these different procedures are not always independent from each other and overlap most of the time. Even in a cave, where carving is so dominant, what is being carved is what has already been piled...

Then, let's start with the example of a cavernous space (e.g. Figure 3.3). As explained in the previous chapter, in order to evaluate the characteristics of the walls of a cave, I am going to refer to their abilities as structural and/or dividing "architectural" elements.

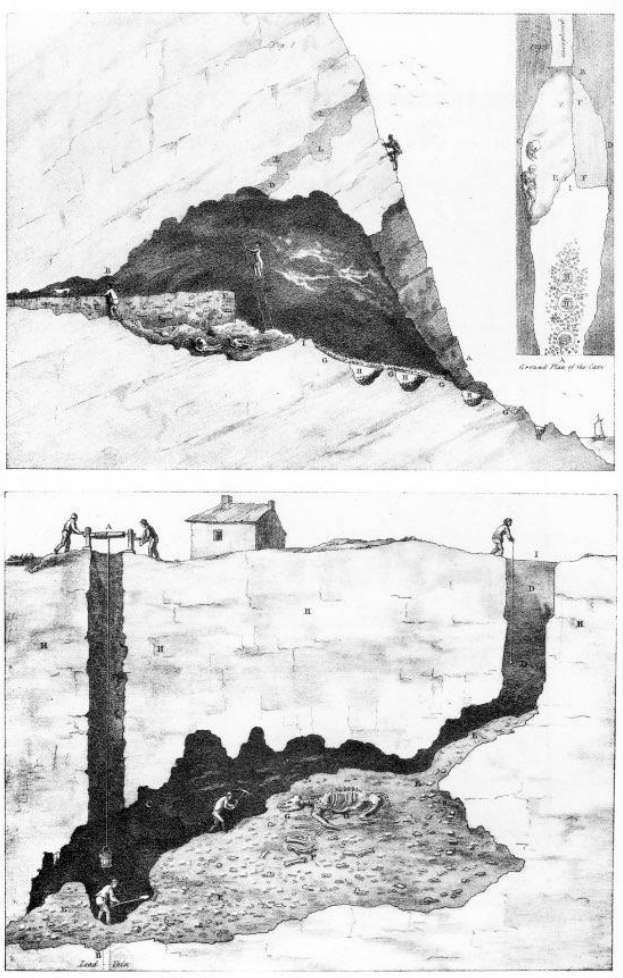


Figure 3.3: Cave sections (URL-28).

First of all, it is necessary to emphasize that within a cavernous space, walls, floor and roof are all part of the same continuous surface and cannot be discerned from each other. Therefore, it is difficult to point at a specific portion and call it “wall”, just because it is vertical, dividing and so forth. Nevertheless, it is still meaningful to understand that, even in such a cavernous situation, some parts tend to behave like walls, while others like floors or roofs. Instead of being delimited as distinct architectural elements, they are gradually blending with each other. Their limits are not definite, but rather transitional.

What is critical for our case, is to understand that each portion is part of the structure, whether vertically or horizontally. According to their locations within the whole, as well as their internal characteristics such as material qualities and formal attributes, all parts belonging to the cave surface play a role in the structure of the cavernous formation, whether critical or trivial.

To be more precise, it is possible to focus on various geological formations in the cave and evaluate each separately. Indeed, "walls" of the cave are not completely vertical, but rather oblique, in such a way to merge with the floor and the roof as mentioned above. This formal attribute allows them to carry the loads easily, from top to bottom, as in the case of corbelling arches[19]. Moreover, with the help of their concavity, they can resist against the earth's pressure and keep the interior hollow.

Besides these oblique walls, other formations which are interesting for our case are stalactites and stalagmites. Suspending from the roof and rising from the floor respectively, these two can even behave as a full column, when fused in the middle (e.g. Figure 3.4). It is possible to state that as columns, they can be considered as structural elements supporting the roof of the cave. In parallel with the walls of the cave, these columns work with compression, but, they differ in principle: they tend to behave as components of a tectonic frame. In other words, they are formed out of the piling of geological matter; however, behave like linear structural elements.

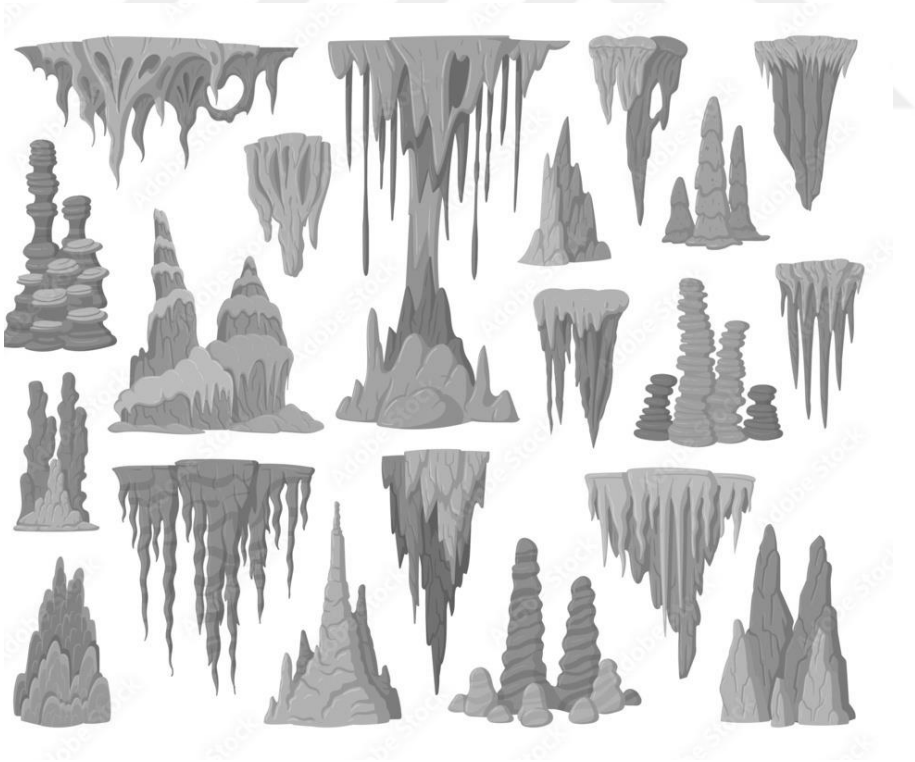


Figure 3.4: Stalactites and stalagmites (URL-29).

19 Patrick Nuttgens explains that "corbelling", based on the principle of "[laying] the stones of the walls on one another so that the upper ones project enough gradually to curve the walls inwards and ultimately meet at the top", "can lead to a tunnel [...]" (Nuttgens, 1983, 11), as in the cases of cavernous geological formations.

Structurally sound, the walls of the cave can be considered as absolute dividers, both physical and visual. Beyond them, there is the underground, dense and dark. Therefore, in order to keep the interior hollow, they have to provide a determined isolation from the exterior. In contrast with the walls, geological formations like stalactites and stalagmites which start to behave like columns, create opportunities for passages among them. They are not blocking the sight, nor the movement. Thus, it is possible to state that, even as it is found, the cave possesses various wall conditions, for the inhabitants to appropriate.

Obviously, aside from these “natural”, “self-generated” formations, there can be “artificial”, or rather, human-made interventions. These add ons can further develop the opportunities provided by the cavernous space, such is the case in various carved settlements like Cappadocia...

After addressing the cave as “the stereotomic pole”, it is now time to look at its tectonic counterpart, the hut. According to the famous architectural theoretician from the 18th century, Abbé Marc-Antoine Laugier, the hut can be considered as an upgraded shelter in comparison with the cave (see Figure 3.5).



Figure 3.5: *Essai sur l'architecture*'s frontispiece by Charles-Sominique-Joseph-Eisen (URL-30).

In the first chapter of his seminal work, *Essai sur l'architecture*, Laugier tells the story of a man in search of a place to live. First, lying on the grass, man goes under the trees in a forest for seeking shade. Nevertheless, this time he finds himself unprotected from the rain and enters in a cave, a dark place lacking fresh air... Disappointed, he goes back to the forest and starts to collect branches. He mounts the stronger ones vertically and adds horizontal and inclined ones on top. Finally, he covers these latter with leaves, allowing him to avoid sun and rain, while also filling the gaps between the vertical branches, against heat and cold. This way, man obtains the primitive hut, which, according to Laugier, is the model according to which all architectural miracles are produced (Laugier, 2022, 10-15)...

Based on Laugier's description, it is possible to state that the hut does not only provide a better space to live compared with the cave, but also an ideal reference for subsequent architectural productions. Like Laugier, Patrick Nuttgens also describes

the hut: “Of the skeleton and skin type of structure, the North American Indian teepee is the classic example, with poles leaning against one another, bound at the top with their ends overlapping, and wrapped round with an animal skin” (Nuttgens, 1983, 11) (Figure 3.6).



Figure 3.6: Yakima tepee with reed mat cover (URL-31).

In parallel with the cave, in a hut, it is not always easy to distinguish the roof from the walls, in contrast with the ground which is rather defined. Nevertheless, according to Laugier’s description, the walls of the hut can be discerned as the fillings between the vertical poles, which he considers as the generators of the idea of column (Laugier, 2022, 13). However, walls belonging to Laugier’s hut are nothing more than isolators against heat and cold, since he does not emphasize their abilities to divide the space.

Indeed, in the hut, walls do not have structural roles, since this is attributed to “columns” and “lintels” obtained with vertical and horizontal sticks, able to be bent. Walls, freed from the obligation to carry, work solely as dividing surfaces, separating

the interior from the exterior. Nevertheless, this ability to divide is obviously not as defined as in the walls of the cave.

Depending on the thickness and opacity of the "skin" covering the tectonic frame, the walls of the hut can have varying degrees of transparency (or opacity). For instance, in case of the North American Indian teepees, especially in traditional examples (they started to be covered with canvas later on), the wooden poles are wrapped in animal skin. Therefore, it is difficult for the sunlight to come in, and for the inhabitant to look out. In other words, the visual connection with the outside is obstructed by the walls of the hut. Consequently, it is possible to claim that walls are able to behave as proper visual barriers, in accordance with the skin's material properties.

In order to address the issue of physical division, it is necessary to refer to the relationship between the walls of the hut and the wind. Although it is impossible to make a general assumption -considering the variety of this type of tectonic structures around the world- it is important to mention that the wind makes the dynamic nature of these walls visible.

In opposition with the cave which is almost "frozen" in time, the walls of the hut are in a constant movement, either stretched, or loosened. As Vilém Flusser states, while the cave (stereotomic) works with the gravity, the hut (tectonic) works with the wind (Flusser, 2012, 56), like "the sail of a ship, or even the wing of a glider" (Ingold, 2015, 29). According to Flusser, there are two types of wall, "the screen wall" and "the solid wall", which coincide respectively with "the tent" and "the house" (Ingold, 2015, 29). Whereas in the house, a "cave-like enclosure formed by the four solid walls", "things are possessed" (Ingold, 2015, 29); in the tent", "an aerodynamic structure that would likely lift off, were it not pegged, fastened or anchored to the ground", "people, and the experiences and sentiments they bring with them, come together, interweave and disperse in a way that precisely parallels the treatment of fibers in fabricating the material from which tent's screen walls are made" (Ingold, 2015, 29).

Finally, it is possible to conclude that in the cave, which can be considered as the stereotomic pole, walls' division is rather absolute and every piece is more or less structural. Whereas in the hut, which can be considered as the former's tectonic counterpart, walls are not structural, since this role is attributed to the poles (columns) shaping the volume. As for their ability to divide (both physically and visually), it is

rather flexible, considering that it changes according to the skin's material qualities and gets affected by the wind.

What about the issue of ontology, in these two opposing wall cases then? It is possible to claim that in the cave, the walls, structural and dividing (except for the case with the stalactites and stalagmites), are definite ontological entities, which exhibit the archetypal functions of the wall, as defined in the previous chapter. Nevertheless, in the hut, the walls' ontology becomes rather contingent, since it gives them the ability to act like "screens" (term borrowed from Vilém Flusser), by freeing them from structural expectations. This independence is further emphasized with their formal instability, as materialized by the impact of the wind. In fact, a person can leave the skin ajar and get in or out. In other words, their role as physical borders is no longer definite, as they tend to behave like boundaries (here we are referring to Richard Sennett once again). In addition to this, their ability to divide visually is not a given anymore, but rather a choice.

Nevertheless, it is possible to state that their "contingency" does not make the walls of the hut lose their ontological essence, as they continue to be integrated with the structural poles. In other words, structure defines the shape of the hut. The skin parallels the virtual geometry that the poles generate, like in the fundamental relationship between the core-form and the art-form defined by Karl Bötticher. Moreover, the role of division is still attributed to them, and not to an external, additional layer. We still go, or see through the walls of the hut, which therefore continue to exist as essential components of the structure they belong.

3.2.2 The Greek Temple

Following the dichotomy between the cave and the hut which allowed me to lay the foundations of the wall's evolution, I will now look at the case of the Greek Temple. As explained at the beginning of this chapter, the purpose here is not to lead a discussion on the wall's history. Therefore, titles are more thematic than specific, even though I will refer to distinct examples.

Especially in the Hellenistic era, Ancient Greek architecture evolved into what is defined today as the Classical style. In this period, columns emerged as the most dominant components of buildings (Farrelly, 2011, 42). The importance attributed to

columns is concretized with the period's emphasis on the orders, which can easily be distinguished by looking at the capitals, the columns' topmost members.

Although the capitals are the most obvious elements showing which order was preferred, it is also necessary to understand that an order was a whole system of proportions. A system which defines everything from the ratio between the length and the diameter of the column, to the distance between columns standing side by side (Farrelly, 2011, 42)...

Nevertheless, in spite of their importance, orders (and columns) will not form the basis of the discussion of this chapter. Instead, here, the focus will be on the walls of a Greek temple. In order to detail what roles were attributed to the walls of such a building, I am going to refer to one of the most recognized buildings of all times, the Parthenon (Figure 3.7).



Figure 3.7: The Parthenon at the Athenian Acropolis The Parthenon at the Athenian Acropolis (photograph by the author).

Parthenon, the most dominant component of Athens' Acropolis, was built between 447 and 432 BC by Ictinus, Mnesicles and Callicrates, under the supervision of the sculptor Phidias, working during the reign of the king Pericles (Nuttgens, 1983, 91). It can be considered as one of the culminations of the Classical style. It is a rectangular monument dedicated to the protector goddess of the city, Athena. It is positioned specifically at its current location, giving an angled perspective from the entrance to the Acropolis, Propylae, and dominating the city of Athens with its elevated ground.

As already mentioned, like in the other examples of the Classical style, at Parthenon columns define the general appearance of the building. Its enclosed "core" is surrounded with series of columns from its four sides: seventeen columns on the long ones and eight columns on the short ones. As can be understood from the capitals of these columns and the building's general proportions, it follows the rules of the Doric order, generally applied after the 6th century BC (Nuttgens, 1983, 91).

In fact, at Parthenon, the dominance of the surrounding columns on the enclosed core is not a coincidence. In his renowned book of architectural theory, entitled *Architecture as Space: How to Look at Architecture* (2015), Italian architect and historian Bruno Zevi claims that the Greek temple was not designed as a home for the worshippers, but rather as the forbidden house of the gods. The worshippers were gathering outside, therefore the focus was also on the building's exterior (Zevi, 2015, 49), leaving the inner core rather neutral (Figure 3.8).

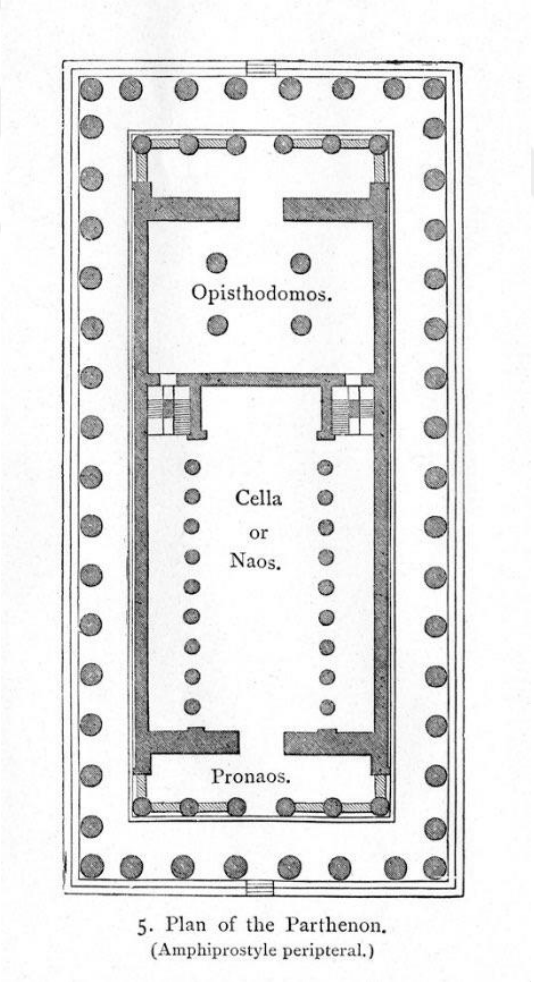


Figure 3.8: The plan of the Parthenon, showing the "core" and the colonnade as an exoskeletal structure (URL-32).

The core itself is divided into two areas, each entered by additional, secondary colonnades. Among these two, the one oriented towards the East used to contain the statue of Athena, whose basis is also surrounded by an internal, third colonnade, whereas the other one contains four free-standing pillars. In contrast with the core's short edges, the long ones are blind walls which do not contain any entrances, nor any columns preceding these.

Besides its role as a precursor in the history of architecture, Parthenon is included in this study mostly because of its ability to merge stereotomic and tectonic methods of wall-making in its own substance, both structurally and metaphorically (Dostoğlu, 2023, 61). At Parthenon, walls and columns share the responsibility for bearing the roof. Both external and internal colonnades, as well as the core's blind walls take part in the general structural design of the building.

Nevertheless, transition between "the tectonics of the columns" and "the stereotomics of the walls" are not limited with the roles they share as structural elements. Before that, this transition occurs "within" the body of the columns themselves. Even though they are stereotomically obtained elements, formed out of the piling of slices of stone, columns of the Parthenon follow tectonic principles, in such a way to form an outer structural frame, together with the lintels connecting them (Dostoğlu, 2023, 62). This in-betweenness reminds us the concept of the joint as used in the Semperian theory of tectonics, which positions the joint between the tectonics of the frame and the stereotomics of the ground.

In addition to this literal (and structural) transition, Parthenon exemplifies a metaphorical transition, or rather, a "transposition" between the two methods of wall making. In the sixth chapter of his book *The Life of Lines* (2015) dedicated to the wall, Tim Ingold explains that "in some instances, materials are transposed from the one mode of construction to the other, such as where stone is cut to resemble the form of a timber frame, as in the classical Greek temple" (Ingold, 2015, 30). Consequently, although stereotomic in essence, columns of the Parthenon do not only behave tectonically in terms of structure, but also in terms of form, as in the case of its triglyphs and metopes, shown in Figure 3.9. In Ingold's words, they "resemble"...



Figure 3.9: Triglyphs and metopes of the Parthenon, referring to wooden construction (URL-33).

After attempting to discuss Parthenon within the context of the tectonic culture, I will now evaluate its walls in terms of our theoretical model. As mentioned above, the walls belonging to Parthenon share their structural roles with external and internal colonnades. Merging the two methods of wall-making, Parthenon can be considered as a stereotomic "core" surrounded by a tectonic "frame". Nevertheless, this hybridization does not prevent its walls to continue their fundamental functions as structural and dividing elements.

Parthenon's walls divide the interior and the exterior both physically and visually, according to the ritualistic needs of its era. The statue of Athena, placed in the heart of the temple and embellished with gold and other precious materials, is not to be seen by unauthorized people. Therefore, the room where it stands is open only from one side. Moreover, this opening looks towards the East, allowing the sunlight to fall on the statue, specifically in the morning, at the sunrise. It is possible to say that at Parthenon, physical and visual divisions that the walls provide are sensitively controlled, calibrated in parallel with the time of the day, as well as the visual angles, both from the entrance to the Acropolis and from the city of Athens lying below.

As for the way they are represented, it is possible to claim that the walls of Parthenon behave as backgrounds, recessed behind the series of colonnades. They can be

considered as blank, neutral surfaces waiting for the shadows of the columns to drop. This positioning further emphasizes the aforementioned distribution of stereotomics and tectonics in the building's layout; keeping the former at the center and leaving the former outside, while also unifying the building's structural logic with its appearance.

3.2.3 The Renaissance Palace

Following the first two phases consisting of the dichotomous relationship between the cave and the hut, and the Parthenon where stereotomics of the core gets hybridized with the tectonics of the frame, I am going to address the Renaissance Palace, which will give us the opportunity to problematize the issue of column and wall in an intricate way.

Indeed, it is seldom to see eras which witnessed as many changes in architecture as the Renaissance (Farrelly, 2011, 48). Nevertheless, it is also wrong to evaluate this era as an isolated time frame, rather than a distinctive "part" of history. Bruno Zevi underlines that there is a rupture in people's mind, between the Renaissance and the eras preceding it. However, according to him, it is possible to trace back the Renaissance architecture not only in the 11th and 12th centuries, but even throughout all the Middle Ages (Zevi, 2015, 86).

In *The Story of Architecture*'s 13th chapter which focuses on the Renaissance, entitled "The Scale of Human Perfection", Patrick Nuttgens starts by underlining the transition between different eras:

"Architectural periods are never neatly bounded. So much do movements overlap that a mason working on Milan Cathedral [...] in the 1440s could have travelled to Florence one hundred and fifty miles away and found work there on a cathedral that represented a quite different attitude towards design" (Nuttgens, 1983, 167).

Although it can be considered as a radical paradigm shift, it is not surprising to see the Renaissance Palace as one of the cases to be evaluated in our attempt to analyze the wall's "continuous" evolution through history. In parallel with the previous phases, first, we will try to shortly examine the general characteristics of the era and then further develop our argumentation by focusing on a specific example.

According to Bruno Zevi, what emerged with *the Quattrocento* was essentially a "mathematical" idea. Against "the infiniteness" of the Gothic and "the randomness"

of the Romanesque, the Renaissance was in search of “an order”, “a law”, “a discipline” (Zevi, 2015, 86). Basically, human scale was brought forward once again, as the reference point of this “new” architecture. According to Nuttgens, “the humanists” of the era, “resurrected the adage of the ancient Greek philosopher, Protagoras, that ‘man is the measure of all things’” (Nuttgens, 1983, 171).

In fact, as Zevi explains, the re-emergence of the human scale connects this period with the Greek Antiquity, although there are centuries between the two. Nevertheless, what differentiates *the Quattrocento* is the application of the “balance” resulting from the adoption of the human scale, into the building as well (Zevi, 2015, 87), without being contended with the outside experience like at the Hellenistic Greek Temple.

Since the general characteristics of the era are outlined, I will now concentrate on the way the wall, as an archetypal architectural element, has been addressed in this specific period. While doing so, it will be useful to look at the Renaissance Palace. However, it is necessary to underline that our focus will not be on the palace’s emergence as a new building type responding to changing demands of the Renaissance society. In other words, the palace will not be addressed in terms of its function or its program, but rather as a tectonic scenery, which will allow us to further investigate the reciprocal relationship between the column and the wall, the linear and the planar, or the tectonic and the stereotomic... This way, it will be possible to follow the steps of the two previous sections and to continue to analyze the wall’s evolution.

If we are to talk about the usage of walls and columns of the Renaissance Palace, it is necessary to start with explaining the role that the era attributed at the structure in general. Although coinciding with Gothic (as previously illustrated with the possibility for a mason to work on two distinct cathedrals in Milan and Florence, with totally different design attitudes), a period which witnessed a kind of union between structure and design; according to Viollet-le-Duc, “the Renaissance, nourished as it was on Vitruvian literature, had nothing but contempt for structure” and witnessed a decisive dissociation between “the architect and the mason”, “form and matter” or “design and structure” (Damisch, 2016, 45).

Nevertheless, even within the confines of the period, this “contempt”, or rather, dissociation, has various degrees, which can be seen in the works of different architects of the era. In order to concretize this, it will be useful to refer to two precursors of

classical architecture, Filippo Brunelleschi and Leon Battista Alberti, and talk about the notion of "wall architecture", which is mostly exemplified in the latter's practice.

At the beginning of the second chapter of his book *Noah's Ark: Essays on Architecture* (2016), entitled "The Column, The Wall", Hubert Damisch points at the difference between Brunelleschi's and Alberti's attributes towards the column and the wall. Damisch states that Brunelleschi, who uses the column "in a deliberately antique spirit" (Damisch, 2016, 46), understands architecture "to be defined by the column as well as the dome" (Damisch, 2016, 47).

Columns were critical for the Florentine master's architecture, but they were not alone while making the surface of the wall. In fact, they were partnering with arches, and these two were coordinated in such a way to exhibit the inner structural logic of the wall, reflecting the distribution of the loads from the roof (either a dome or a basilical roof) to the ground. Of course, the exhibition of the structural logic was always in accordance with human proportions (defined at the beginning of this section as one of the main characteristics of the Renaissance era, with reference to Bruno Zevi) and possessed a kind of internal harmony.[20]

In parallel with Filippo Brunelleschi, in his famous *De re aedificatioria*, one of the seminal books on the essence of classical architecture, Alberti underlines the importance of the column and claims that "there is nothing to be found in the art of building that deserves more care and expense, or ought to be more graceful, than the column" (as cited in Damisch, 2016, 45-64). However, it is possible to say that in Alberti's theory of architecture, the column cannot be considered as an independent architectonic element (such was the case for Brunelleschi), but works rather as part of the whole structural system.

Furthermore, for Alberti, this structural system can be equated with the wall itself, or rather, the *paries*, if we borrow his own term. Damisch explains that "his [Alberti's] entire effort seems to have been directed toward defining a mode of construction in which the skeleton could not be distinguished from the *paries* and in which the

20 According to Patrick Nuttgens, this idea of harmony came from the revelation that "musical intervals in harmony were exactly proportional to numbers in physical dimensions", which was considered by the architects of the era, including Brunelleschi, as a way to base the dimensions within the buildings to "the fundamental laws of nature and of God" (Nuttgens, 1983, 169).

relationship between the column and the wall was expressed in mechanical (rather than decorative or plastic) terms" (Damisch, 2016, 56).

Despite Viollet-le-Duc's claim, it is not that easy to talk about "a contempt for structure", but rather a repositioning of it, related with the reinvention of the human scale both outside and inside the building (as Zevi explains) along with a new understanding towards the relationship between the column and the wall, as can be seen in both Brunelleschi's and Alberti's approaches, although in various degrees.

Before going into the details of the Renaissance Palace, which will serve as the exemplary case of this specific stage within the wall's evolution, it is also necessary to deepen the topic of wall architecture and explain how the column and the wall are integrated in Alberti's architecture. According to Damisch, this process of integration has various aspects. However, from the perspective of a wall, or rather, *paries*, working as a continuous structure, the column can be considered as "a reinforced part of the wall" (Damisch, 2016, 57). In *De re aedificatoria*, Alberti states that "it may not be wrong to describe the column as a certain, solid, and continuous section of wall, which has been raised perpendicularly from the ground, up high, for the purpose of beating the roof" (as cited in Damisch, 2016, 45-64).

Nevertheless, it is possible to say that this is not the only reasoning behind the integration between the column and the wall in Alberti's architectural theory. Besides being the "most solid" part of the wall, it is also "the noblest" (Damisch, 2016, 60)... Which differentiates what is already integrated, is not only a structural quality, but also the meaning attributed to it, or, if we use this study's lexicon, the representational aspects of the column on the surface of the wall.

In other words, the column placed on the wall stands out from the perspectives of both its ontological essence and its representational character. With its material qualities (especially in case of monolithic examples) (Damisch, 2016, 60) and its proportions, it becomes a specialized section within the wall. Hence, although considered as wall architecture, Alberti's work does not exclude the column, but reevaluates it as an articulated element.

Damisch asks: "When Alberti defines the column as the principal ornament of architecture, does he mean to ignore its structural properties in order to concentrate solely on its appearance, its decorative value?" (Damisch, 2016, 60). According to

him, the answer is negative, because it is not possible to talk about “an opposition” in the case of the Genoese theoretician and architect.

Since I already talked about the general characteristics of the Renaissance architecture, with a focus on wall architecture and the relationship between the column and the wall, especially in Leon Battista Alberti’s theory, it is time to look at the case of the Renaissance palace. For that purpose, I am going to refer to one of Alberti’s own examples: Palazzo Rucellai (see Figure 3.10). This way, it will be possible to portray the wall as an architectural element of this specific era.

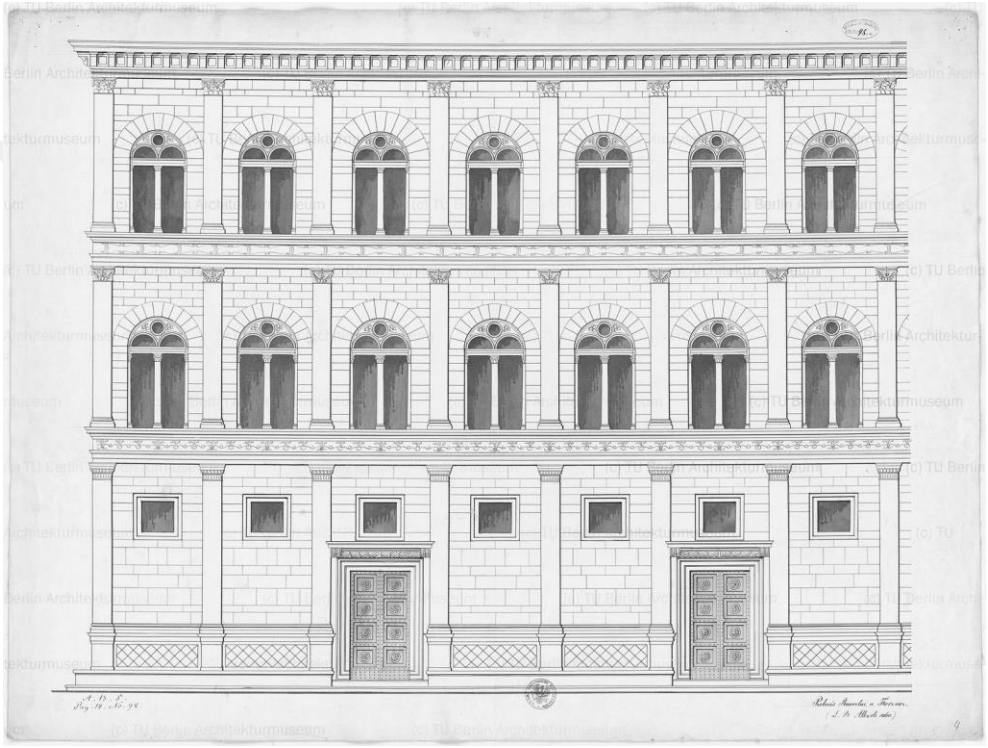


Figure 3.10: Palazzo Rucellai’s elevation (URL-34).

First of all, it is possible to discern Alberti’s theoretical work from his architectural practice. As mentioned previously, in his theoretical work, Alberti underlines the importance of the column. Nevertheless, in his architectural practice, the column disappears, by getting integrated with the wall. Even so, it has been showed that the integration in question cannot be considered as a “disintegration”, but a differentiation. The wall’s, and even the whole structure’s own specialization...

Such is the case at Alberti’s Palazzo Rucellai, which was built between 1446 and 1451 in Florence, for the Florentian merchant Giovanni di Paolo Rucellai. Although it can be discussed from the perspective of its program, here, our focus will be on the palace’s

facade, which is a good example of the aforementioned relationship between the facade wall and the columns integrated with it.

At first sight, it can be said that Palazzo Rucellai is a three storey building. Nevertheless, there is actually a hidden fourth floor under the roof, with a recessed facade that has almost no openings. Because of this recession, the building is mostly recognized with the composition of its first three levels. In such a way to differentiate the programs contained within, while also giving the facade a sense of hierarchy, Alberti superposed three different architectural orders, which correspond to each level, reminding the Roman Colosseum's facade: Doric at the base, Ionic at the second and Corinthian at the third... It is also possible to read this sequencing as a transition from the least decorated, to the most decorated order. Nevertheless, at Palazzo Rucellai, the reference to Roman architecture is not limited with the superposition of three orders. According to Patrick Nuttgens, "here emerges the Roman ABA motif, which was to appear in a hundred guises on Renaissance buildings –low arch, high arch, low arch; pilaster, window, pilaster; turret, dome, turret" (Nuttgens, 1983, 167-180), as can be seen below, on Figure 3.11.



Figure 3.11: Palazzo Rucellai's elevation: Columns as fortified zones on the surface of the facade wall (URL-35).

In parallel with other Florentine palaces of its era, Palazzo Rucellai's facade seems rather "uninviting", "using rough masonry [...] known as 'rusticated' masonry, a word meaning 'countrified', for the stones were not smoothed off, but deliberately left rough-hewn as if they had come from the quarry" (Nuttgens, 1983, 167-180). In contrast with some other examples of the same era, having an emphasized, rather exaggerated rustication at ground level; here, the degree of rustication did not vary between different floors. However, dimensions of the stones got gradually smaller towards the cornice, hiding the recessed fourth floor.

Nevertheless, at this point, it is necessary to say that what really emphasizes the separation between the three stories is not the use of different orders, nor the rusticated stones' gradual decrease in size from bottom to top; but the two entablatures, giving the facade a general sense of horizontality, which is counterbalanced with the rhythmic use of pilasters. As mentioned previously, in parallel with the entablatures, these latter

are not independent structural elements per se, but specified, accentuated sections of/within the facade wall, which, therefore, does not leave its role as a structural element.

In fact, on the contrary, the facade wall of Palazzo Rucellai is a perfectly structural surface, which pretends to behave conversely, as if it was freed from this "burden", giving its load-bearing capacity to the decorated pilasters. Even if the sequencing from Doric to Corinthian orders further emphasizes the intention to "liberate" the wall, attributing the ground floor the role of the stable foundation and allowing the third floor to look rather "loose", it is necessary to say that Palazzo Rucellai's facade wall works as an integrated system, consisting of both these pilasters and the infilling masonry.

The transition from stable to loose, from heavy to light, brings us to the second ontological attribute of the wall as a divider, which is previously defined as its ability to work as a visual and physical barrier. In opposition with the down-sizing of the stones, windows get bigger from the ground towards the roof: At the upper two levels, they are considerably bigger than the ones on the ground, which are merely square-shaped openings which do not aim to establish a visual relationship between the interior and the exterior, but help with the natural ventilation. Consequently, we can say that here, the facade wall's ability to divide the sight is not stable, and varies according to the height.

Finally, it is possible to claim that Palazzo Rucellai's facade provides us a multi-layered reading on the relationship between the column and the wall, as well as a suitable sample within the evolutionary development of this latter as an archetypal architectural element. At Rucellai, from top to bottom, the wall "loses" its decoration, in other words, its representational quality, following the transition from Corinthian, through Ionic, towards Doric orders.

Nevertheless, if we look at this same sequencing from a different perspective and consider also the increase in stone dimensions, we tend to think that the facade becomes more "structural", or rather, more load-bearing towards the ground. This is further emphasized with the down-sizing of the windows, which also gives the wall a gradual, or rather variable ability to work as a visual barrier... Consequently, it is

possible to say that Rucellai's facade wall is a surface of possibilities, covered with a network of intricate relationships between the wall's ontology and representation...

3.2.4 The Modern House

Following the problematization of the relationship between the column and the wall and an analysis of the latter's continuous evolution in a third phase (based on a reading of Palazzo Rucellai), I will now look at this architectural element's status in more recent times. To be more specific, the wall will now be analyzed as a rather troubled element of the Modern House.

As mentioned at the beginning of this part, it is possible to read the wall's tectonic evolution as an oscillating movement between the poles of tectonic and stereotomic. However, especially after the nineteenth century, and certainly as a result of the efforts of Modern Architecture, the movement in question lost its balance, as explains Adrian Forty:

"Since the late nineteenth century, it has been impossible to avoid the redundancy of the wall: every wall is to some degree a commentary on its own superfluousness, and, in all its various renderings, this is the principal theme to have dominated the architecture of walls for the last hundred years" (Forty, 2013, 13).

While problematizing this issue of redundancy, the modern house provides a fertile discussion ground. Either with its panoramic windows on the facade, liberated now from its structure (in Le Corbusier's terminology, "facade libre"), or with its "total" transparency, as in the case of the Farnsworth House, which will be the example to be analyzed in this part, the modern house deeply shook the position of the wall as a fundamental architectural element.

At the beginning of this study, in the section entitled "The Wall's Ontological Crisis", the wall's "disappearance" was already considered as a reflection of the architect's attitude towards this element, rather than a sign of invariance. By eliminating the wall, the architect was in fact problematizing its existence. As the quintessential architectural example which eliminates the wall, Farnsworth House, designed by one of the Modern Architecture's pioneering figures, Mies van der Rohe, will be used to characterize the fourth phase in the wall's tectonic evolution.

Starting from 1930, at the request of its founder Walter Gropius, Mies van der Rohe became the director of the school of Bauhaus. Following the school's compulsory relocation from its famous campus in Dessau, to an abandoned telephone factory in Berlin and its inevitable closure under the pressure from the Nazi authorities, Mies emigrated to the United States in 1937 (ArchDaily Team, 2021). Here, he found the opportunity to work on larger scale projects, compared to the ones he had in Germany, as exemplified by his multi-storey residential and commercial towers.

What is characteristic in Mies van der Rohe's architecture can be considered as his emphasis on the structure, made out of industrial steel, as a space-making tool. Nevertheless, especially at the beginning of his career in the United States, his knowledge on the specifics of steel structure seems rather limited. In his article dedicated to Farnsworth House, and entitled "Flooded at the Farnsworth House", Michael Cadwell explains that, "in the 1920's, Mies had championed glass and steel technologies in his terse manifestos and had abstracted them in his visionary projects. Glass and steel were the quotidian facts of construction in the Unites States [...] Often repeating the word 'structure' like a mantra to his young office assistants in Chicago, Mies, these assistants soon realized, knew little about statics of the advanced state of the American steel industry" (Cadwell, 2007, 96).

With the new technologies at hand, Mies had faced a new challenge, especially with his large-scale commissions. Nevertheless, these challenges were also valid with the smaller scale, residential projects, as can be seen in the case of Farnsworth House, shown in Figure 3.12. The house in question was designed and constructed for Dr. Edith Farnsworth and located in Plano, Illinois, outside of the city of Chicago, where Mies practiced and taught architecture, during his stay in the United States. It is conceived as a weekend house and possesses one bedroom. Nevertheless, considering the totality of the space within the house, it is not easy to describe it in terms of its functional units, and in fact, this challenge makes the observer focus on its structure and tectonics instead.



Figure 3.12: Farnsworth House with its glazed facade showing the interior and reflecting the exterior (photograph by the author).

In this chapter, wall's tectonic evolution has been analyzed through fragments of history. It started as part of a total envelope, merged with the ground and the roof (such in the case of the cave), became part of a dialogical relationship with the column, being isolated from, or attached to it. It was always there, present, as a fundamental architectural element, structural and/or dividing. Nevertheless, as explained at the beginning of this part, with Modern Architecture, by transferring its archetypal functions to other elements, it became "redundant", and ended up being disappeared from the architectural scenery. In fact, it is by losing its ontological functions and becoming purely representative, and even by totally vanishing in some extreme cases, that the wall's ontological crisis occurred.

However, even in its utter "demise", it is necessary to analyze the wall in terms of its tectonics and continue our investigation into its tectonic evolution. As mentioned previously, Farnsworth House can be considered as one of the "extreme cases", where the wall seems to leave the architectural scenery. To understand how, it is useful to evaluate the house's structural logic.

First, it is built as a steel structure, where the structural skeleton has been left exposed. It is carried with the help of eight columns, and sits on a platform elevated from the ground, because of being positioned in a flood plain. There is also a lower platform,

working as the house's entrance deck, this time carried with six columns. The facade walls are fully glazed, giving the steel skeleton the impression of being emptied out.

If I refer to this study's theoretical model, it is possible to claim that, at first sight, at Farnsworth House, the walls transferred all their structural role, to a tectonic system made from steel, filigree elements. And in fact, this transfer is not limited with the walls' load bearing capacity: Here, the walls no longer work as proper dividing elements either, because of the importance that the architect gave to transparency. Although it is possible to say that they remain as physical barriers, glazed facades lose most of their capacity to divide the interior and the exterior in terms of vision. It is even possible to say that here, Mies's famous silk curtains are the only physical device that block the view. Consequently, and as can be seen on the coordinate system diagram in the next chapter, walls of the Farnsworth House are quite different than the previous cases and make us question their existence. How will we be able to talk about walls as fundamental architectural elements when they transfer / share almost all their ontological roles with other elements in the system?

Although quite literal, even the disappearance from the architectural scenery has some nuances. First, it is necessary to underline that, at Farnsworth House, the physical separation is almost certain. Because of the architect's insistence on the thinness of the mullions and his emphasis on the transparency, there are only two operable openings: The entrance door itself, and an openable window on the opposite facade, in the bedroom, right across the bed, shown in Figure 3.13. Considering the total area of the four facades, this seems very limited.



Figure 3.13: Farnsworth House's only operable window, located across the bed (photograph by the author).

Secondly, being totally glazed is not necessarily the equivalent of being totally transparent. In fact, reflection of the surroundings is a strong design tool, that Mies resorted to, on almost all the surfaces, and not only on the glass. The steel structure, left deliberately exposed, as well as the plaster on the ceiling, are both reflective, enriching the spatial experience and strengthening the building's presence in the nature. In a way, Farnsworth House does not disappear within the nature, but rather blends with it. Through reflection, walls continue to exist.

Since I already outlined the challenges to define the status of the walls of the Farnsworth House as a total demise, by questioning their capacity to divide, I am going to refer to their role as structural elements. Evidently, the architect's design choices make clear that, here, the walls belonging to the facades are, or rather, seem fully independent from the building's structural logic. Nevertheless, talking about a total rupture would be a limited reading. Yet, before detailing the way the walls become part of the structure, it is necessary to look at the intricacies of Mies van der Rohe's design. First, by positioning the columns in such a way to liberate the corners, Mies gives the three horizontal platforms, constituting the entrance deck, the house's ground slab and the ceiling, an impression to float in the air. This way, not only the facade walls, but also the columns started to look independent from the structural system.

And in fact, this is not the only method that the architect applied, for strengthening the volatility of the house. By recessing the beams inside the columns, in such a way to "erase" the column - beam connections, the sense of independence attributed to the columns is further emphasized. In his previously mentioned article, "Flooded at the Farnsworth House", Michael Cadwell details this connection, listing the steps the contractor had to follow, while erecting the steel structure. According to him, this requires an intricate procedure, based on erasing the previous step, before taking another one, and can be defined as a plug welding process: "steel erectors first drill the columns with holes at the beam connections and fit the columns with erection seats; they then place the perimeter beam on these seats, shim the beam level, and clamp it secure; next, welders plug the vacant column holes, fusing the column to the beam; and finally, finishers remove the erection seats and sand all surfaces smooth" (Cadwell, 2007, 113).

With the help of this step-by-step process of plug-welding, based on an idea of "erasing" the connection, which, according to Cadwell, shows that the house "does not glorify the industrial process of steel production and fabrication" (Cadwell, 2007, 115), Mies van der Rohe manages to separate the columns from the totality of the structure. This way, not only the facade walls, but even the columns seem to leave their structural roles. Nevertheless, it is important to underline that this is only a play with the perception, and not a real rupture.

As mentioned previously, the hidden nature of the relationship between the columns and the structure, is also valid for the walls. Cadwell states: "All reports to the contrary, the Farnsworth House does have walls" (Cadwell, 2007, 119). It is possible to say that the steel stops framing the glass, concretize the existence of the facade walls. Moreover, the steel mullions between the glazed surfaces, participate at the building's structural logic (see Figure 3.14): "Mies's assistant Myron Goldsmith supplemented the floor's carrying capacity by enlisting the intermediate steel window mullions as tensile members to connect the floor to the roof" (Cadwell, 2007, 112). Consequently, Farnsworth House's glazed facade walls do not work as curtain walls, contrary to their transparent look, but, to some extent, become part of the structure. Considering all these, here, how would it be possible to completely disregard the load-bearing capacity of the walls?



Figure 3.14: Load-bearing steel mullions and silk curtains as visual barriers (photograph by the author).

Finally, it is possible to conclude that Farnsworth House, as one of the most recognized residential examples of Modern Architecture, stands as a case where the walls lose a big majority of their ontological essence. Nevertheless, at close-sight, and with further investigation, we can continue to observe that they continue to preserve their archetypal functions, being load-bearing and dividing.

3.2.5 The Stereotomy Re-Interpreted

In the last phase of the wall's tectonic evolution, a contemporary stereotomic example will be analyzed. This way, especially after a case such as the Farnsworth House, where walls seem to disappear, a case where tectonic's domination over stereotomic can be said to be literal, despite its opposite characteristics argumented above, a stereotomic example will provide us the means to consider a case where wall reclaims its position as a fundamental architectural element.

It has already been explained that, in the recent years, a contemporary stereotomic architecture that makes use of new design and construction methods has become increasingly popular in the architectural media (Sarkis, 2017, 101). 35 Green Corner Building by Studio Anne Holtrop is among the examples of such an architecture (see Figure 3.15). The building in question is located in Muharraq, Bahrain and was completed in 2020. It works as a storage space for an art collection that belongs to Sheikh Ebrahim Center, a local cultural institution. It is part of a big-scale urban renovation project, called the Pearl Path Project, referencing to the city of Muharraq's pearling history. The name "Green Corner" is taken from the vertical garden designed by renowned landscape designer Patrick Blanc, and located across the building site (Studio Anne Holtrop, 2021).



Figure 3.15: 35 Green Corner Building along with Patrick Blanc's vertical garden (URL-36).

35 Green Corner Building consists of four similar floor plans, including two equivalent rooms at the sides and a core in-between, that contains the vertical circulation. It can be said that, because of the shape of the site, which limits the usable interior space with its distinctive narrowness, the facades got emphasized in terms of both their appearance and spatiality (Dostoğlu & Uluoğlu, 2022, 200). And in fact, at 35 Green Corner Building, facade walls are the main elements that exhibit stereotomic qualities.

At first look, 35 Green Corner Building can be considered as a perfect example for a certain type of stereotomy, based on the piling up of building blocks. Nevertheless, to

be contended with such a consideration would not allow to cover the totality of this building's stereotomic character. Since, it is by blending two conventional stereotomic operations in an innovative way, in other words, by re-interpreting traditional stereotomy, that 35 Green Corner Building stands as a contemporary stereotomic architectural example (Dostoğlu & Uluoğlu, 2022, 201).

In fact, observed from a closer distance, the facade walls can be said to be produced by stacking randomly carved solids: First, facade panels are "carved" on site, and then get "stacked", or rather, positioned on the facade. It is the culmination of these two procedures, stacking and carving, that facade walls are obtained (Dostoğlu & Uluoğlu, 2022, 201).

The in-betweenness of the building's stereotomic character, can also be read in the context of a stereotomic part-whole relationship. Evidently, 35 Green Corner Building's facade walls behave from the part to the whole: Sand-cast concrete panels, aluminum framed windows and perfectly shaped concrete floor slabs come together to shape the totality of the facade. As mentioned previously, while describing stereotomy's attributes, in general, going from the parts to the whole coincides with an operation of stacking, while going from the whole to the parts is attributed with an operation of carving. However, at 35 Green Corner Building, these two logics can be said to be used together. Sand-cast panels are produced on-site, by pouring concrete directly on the ground. This way, each panel reflects the site's topography. In a way, the production procedure of the panels can be considered as a process going from the whole to the parts, from the site's surface qualities, to the panel's surface intricacies. Following its production, each panel is then "stacked", positioned on the facade, according to its predetermined location (Dostoğlu & Uluoğlu, 2022, 201).

In terms of its decoration, 35 Green Corner can be described as a rather distinctive building. It is obvious that the facade walls, composed of sand-cast concrete panels, are reminiscent of a monolithic, and even, considering the panels' remarkable sizes, of a cyclopean architecture (Dostoğlu & Uluoğlu, 2022, 201). Besides such a direct reference, 35 Green Corner Building exhibits two stereotomic features: Texture and mouldings.

At 35 Green Corner Building, the joints among the panels are left intentionally visible, thus, make the facade's texture a direct parameter of its decoration (Dostoğlu &

Uluoğlu, 2022, 201). It is possible to argue that the verticality of these joints, extending from slab to slab, balances the facade's general feeling of horizontality, emphasized with the help of the projecting floor slabs. The contrast between horizontal and vertical elements refers also to the building's stance between a traditional construction method such as stereotomy and a contemporary building technique. Nevertheless, we are going to deepen this discussion at the end of this part.

Along with the texture, mouldings consist of another aspect of the building's stereotomic character. Here, the sand-cast concrete panels' depth are exposed both along the edges of the window apertures and the building's corners, as can be seen in Figure 3.16. This way, the building's decoration gains a three-dimensional character, surpassing the superficiality of its texture (Dostoğlu & Uluoğlu, 2022, 201).

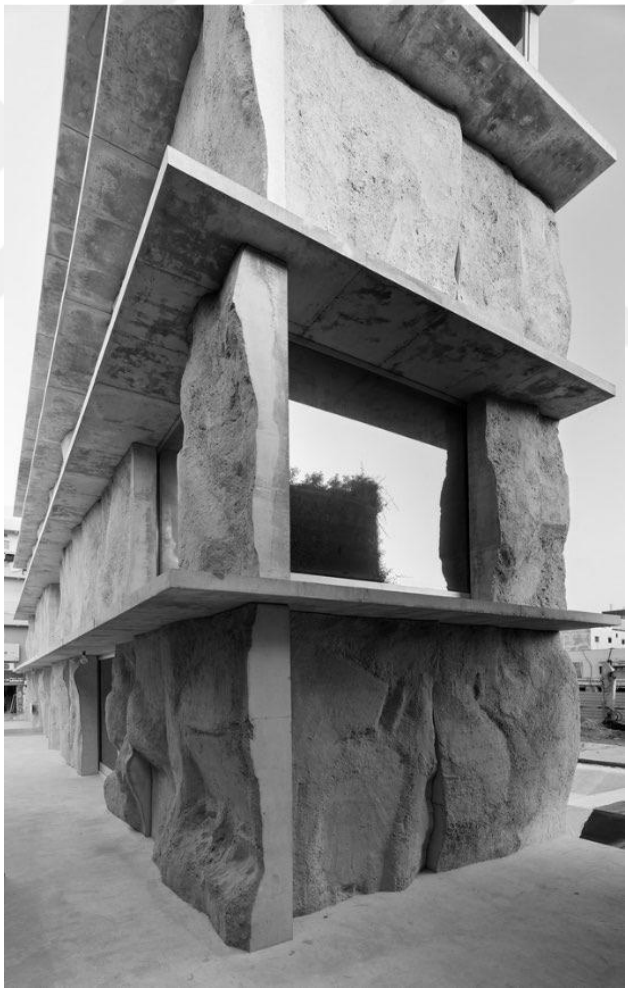


Figure 3.16: 35 Green Corner Building's short edge, exposing the thickness of the wall panels (URL-37).

In fact, it is possible to argue that at 35 Green Corner Building, the depth is not only a part of the building's decoration, but also a tool to make space (Dostoğlu & Uluoğlu,

2022, 202). Because of the site's distinctive narrowness, Studio Anne Holtrop uses the facade wall's depth to give the building more spatiality, as explained in the project description: "The plan is very shallow in-depth and has one long main facade with two short-end facades. With the shallow depth of the plan, the facade itself is the main spatial element" (Studio Anne Holtrop, 2021). As Semper states, the space-making is what differentiates a certain type of stereotomy, from the ones that are dominated by a tectonic behavior (Semper, 2006a, 552).

Since I already defined the way stereotomy operates in the case of 35 Green Corner Building, I can now differentiate it from a conventional application of stereotomic architecture, and to position it as a stereotomic re-interpretation. Although it follows stereotomic principals, Anne Holtrop's building stands out with the way it interprets these.

First, it is important to underline that, 35 Green Corner building does not use stone as its primary construction material. As mentioned previously, stereotomy does not refer to any specific material, and points directly at the cutting of solids. Even so, it is clear that in the architectural literature, it often points at stone masonry construction. It can be argued that, by using reinforced concrete, a forerunner among the materials of the 20th century's tectonic architecture, 35 Green Corner Building starts to blend the two dialogical construction systems: Tectonics and stereotomy.

Moreover, as explained at the beginning of this part, it merges the two stereotomic operations: Stacking and carving. Its facade walls are made of sand-cast concrete panels, which are first randomly carved, following the earth surface surrounding the site, and then stacked to their pre-determined positions between floor slabs.

It is undeniable that, by finding new ways to use stereotomy, in other words, by re-interpreting it, 35 Green Corner Building can be considered as an architectural example which manages to adapt this old construction technique to contemporary architectural needs. However, before deepening this discussion, it is necessary to analyze the building in question, in the context of the wall's evolution, by referring to our theoretical model.

It is clear that the facade walls of 35 Green Corner Building are both structural and dividing. As re-interpreted stereotomic entities, these walls unify once again tectonic wall's disintegrated abilities, or, in this study's lexicon, its archetypal features. Here,

walls made of sand-cast concrete panels are vertically transferring the loads from the roof to the foundation. Working as shear walls, they carry the floor slabs without the necessity to use additional beams or columns.

Moreover, the facade walls are definite dividing elements, both physically and visually. Even from a perceptional perspective, their robustness implies a clear obstacle to passing and/or seeing). Window and door openings placed among them are piercing through the panels, allowing the wall's ability to be penetrated in a selective way, while also exhibiting its thickness and depth, which further enhance the facade's decoration.

Inside, the ceilings are also obtained with sand-casting, resulting in a cave-like atmosphere. Nevertheless, it is not possible to talk about a continuity between the walls and the ceiling (as in the case of a natural geological cavity), which are purposefully designed as separate architectural elements. In fact, this distinction can be considered as one of the most important features of the design. Contrary to the outside, where the walls are porous and the slabs are smooth, on the interior, the facade walls are smooth while the ceiling is porous, creating a kind of perceptional inversion.

The aluminum entrance door, as well as the window shutters are designed in the same way as the wall panels, however this time, the sand cast bodies are hollow. This way, although the appearance is similar in terms of porosity and robustness, the weight is much lesser, further enriching the interplay between various architectural elements and their reciprocal textural qualities.

Finally, it is possible to claim that 35 Green Corner Building is a contemporary stereotomic architectural example, which, instead of mimicking traditional stereotomy, reinterprets it in such a way to make it applicable for contemporary needs and realizable with contemporary means.

Jingdezhen Imperial Kiln Museum will be the second stereotomic re-interpretation case to be analyzed (see Figure 3.17). The museum is located in the city of Jingdezhen, at China's Jiangxi Province. It is designed by the architectural firm Studio Zhu-Pei and was opened in 2020. Located in the historical center of Jingdezhen, it is adjacent to imperial kiln ruins. Jingdezhen has a long tradition of pottery, which makes kiln a prevalent element in the city and a fundamental reference for the design of the museum (Han, 2021).



Figure 3.17: Jingdezhen Imperial Kiln Museum as an agglomeraiton of kiln-like vaulted structrues (URL-39).

It can be said that the Jingdezhen Imperial Kiln Museum is designed as a cluster of vaulted volumes, creating courtyards in-between. As the floor plan shows (see Figure 3.18), these volumes have all different sizes depending on their positions on the site and their functions. The design team created a museum trajectory, by connecting these vaulted spaces through arches and passages (Dostoğlu & Uluoğlu, 2022, 202).

Jingdezhen Imperial Kiln Museum is, by definition, a stereotomic case where cut solids (here, a mixture of old and new bricks) are stacked to generate volumes. Nevertheless, it has to be mentioned that by vaulting, the design team managed to create a cavernous atmosphere, which would normally obtained by carving. By focusing on the bricks, one sees a stacking activity, whereas by focusing on the whole volume itself, one can think of a carving operation. It can either be considered as a result of stacking the parts to obtain the whole, or an emptied whole to create parts within (Dostoğlu & Uluoğlu, 2022, 202).

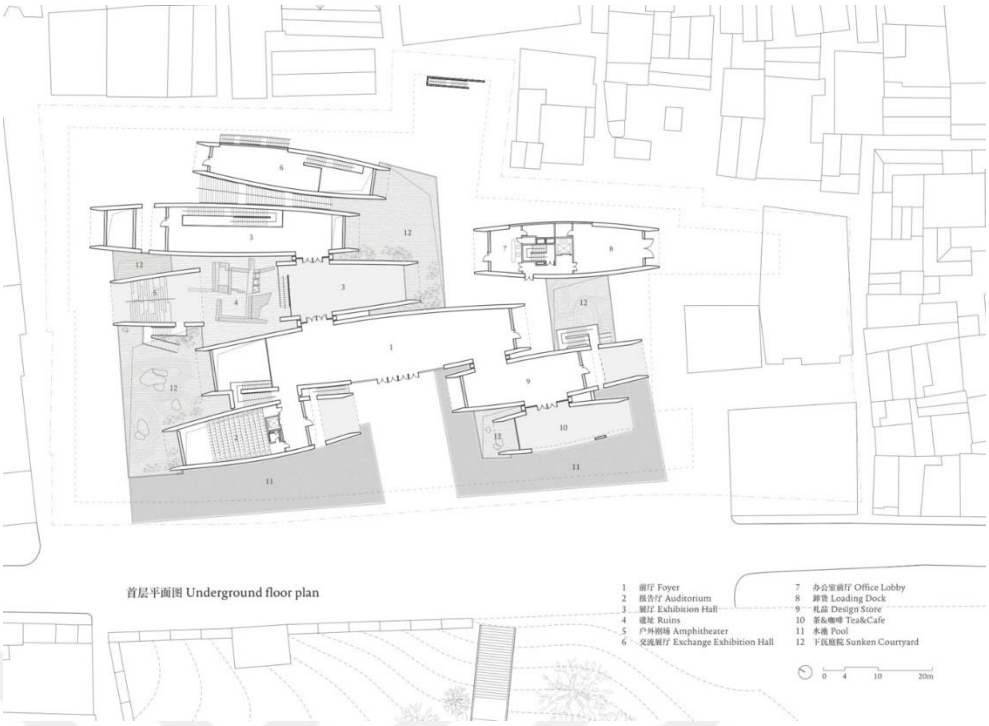


Figure 3.18: Jingdezhen Imperial Kiln Museum floor plan (URL-40).

It is necessary to emphasize that Jingdezhen Imperial Kiln Museum differs from the cases evaluated through this chapter, except from the cave. As in the case of a cavernous space, at this museum, it is not possible to distinguish the walls forming the volumes, from their roofs. Here, the wall and the roof merge with each other, while generating vaults or arches defining the volumes. From this perspective, Jingdezhen Imperial Kil Museum becomes a suitable stereotomic example, where this ancient construction system becomes "a mighty spatial art" (in Gottfried Semper's terms), giving primacy and independence to stereotomy, without mimicking any tectonic operation.

Even though it is not possible to distinguish the walls from the roofs, at Jingdezhen Imperial Kiln Museum, the envelopes are both structural and dividing (both physically and visually). There are no additional, linear load-bearing elements other than the envelopes themselves, which are already able to carry the loads, along with vertical and horizontal forces, towards the ground, following the shapes of the volumes they cover. Still, whenever there is need for an opening, the envelope is cut via arches or gates, allowing for a selective physical and/or visual passage (Figure 3.19).

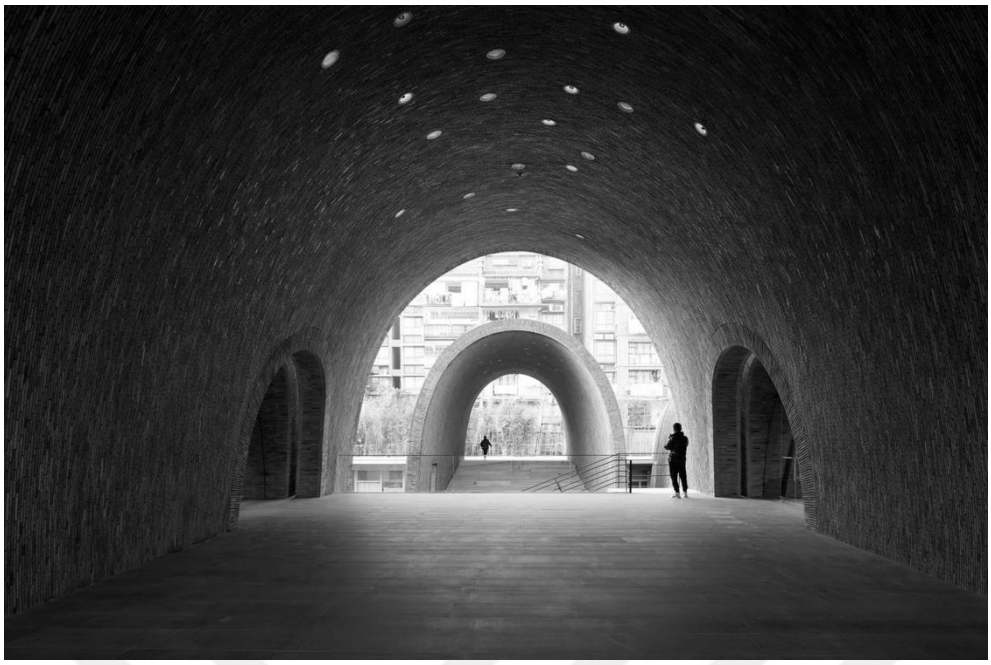


Figure 3.19: Arches "cutting" the envelope at Jingdezhen Imperial Kiln Museum (URL-41).

As for the decoration, it is possible to say that the exposure of the bricks is the principal characteristic of the Jingdezhen Imperial Kiln Museum. By blending old and new bricks, the design team managed to generate a rich texture, merging different colors, tones and even time zones. The idea of recycling bricks is actually a tradition of the city of Jingdezhen, since, the brick kilns were being demolished periodically in order to keep their thermal performance. This constant activity of demolition and reconstruction provided the city with high amounts of brick, as building material (Han, 2021). The vaulted volumes are pierced with arches on their long edges, exposing the thickness of the brick shell. However, here, the visibility of the thickness is not a result of the usage of the mouldings, but rather a consequence of the intersection of two geometries (Dostoğlu & Uluoğlu, 2022, 202).

Jingdezhen Imperial Kiln Museum is an agglomeration of brick vaults and arches. Vaults make the space, whereas arches (and gates) define the entrances, exits and connections. In fact, the museum can be considered as a literal application of a stereotomic space-making, based on the combination of these two geometries (Dostoğlu & Uluoğlu, 2022, 203). In the project description, the architect talks about the formation of a traditional brick kiln and explains that it is built with a special technique, without using any scaffolding. With the help of its thinness and lightness, the brick allowed for "a maximum interior space with minimum materials" (Han,

2021). Nevertheless, differing from this tradition, at Jingdezhen Imperial Kiln Museum, the vault is based on a sandwich system, consisting of two layers of masonry brick and an additional layer of concrete poured in-between (Han, 2021). Therefore, it is possible to argue that here, we see a composite system, reinterpreting a traditional stereotomic construction system by adding a new material, which is usually preferred in a tectonic construction, within.

The final stereotomic re-interpretation case will be the Cappadocia Region Museum (Figure 3.20), which, like the two former examples, merges various stereotomic operations (stacking and carving), both with each other, and with tectonic methods and/or materials. However, before going into the details of these mixings, and investigating the way walls behave, I will describe the project in question.



Figure 3.20: Cappadocia Region Museum, merging various stereotomic operations (Yalın Architecture archive).

Yalın Architecture started working on the project in 2015 and the construction started in 2018. However, it remains unfinished today. In fact, it can be said that the incompleteness of the building facilitates the observation of the construction, which exhibits different stereotomic (and tectonic) procedures (Dostoğlu, 2023, 63).

It has been stated before, that stereotomy, by definition, is the process of cutting solid objects to obtain complex geometries, and that the process in question can proceed from part to whole or from whole to part. Beyond meeting this simple definition, the

Cappadocia Regional Museum stands before us as an example where this part-whole relationship is established in both directions. Moreover, the fact that it is a local example, contributes to the opening of the discussion ground of this study, for our geography (Dostoğlu, 2023, 63). However, I will detail this in the final chapter.

Cappadocia Regional Museum consists of two disconnected masses. The first one is a rock formation that was used as a quarry until the 1980s and was hollowed out due to its function. The museum's exhibition areas are placed in the labyrinthine cavities of this rock, that resembles anthills. Just to the southeast of the rock, there is a visitor center, which was partially buried in order not to cover the background. The design team planned to build the visitor center with stones from the excavation in the area where it is located (Dostoğlu, 2023, 63).

At first glance, it can be thought that the exhibition areas located in the rock formation are shaped with a stereotomic process going from whole to part, in the form of carving, and the visitor center was built by stacking, from part to whole. However, when these two construction processes are examined in more detail, it will be seen that both were shaped by multi-layered stereotomic processes (Dostoğlu, 2023, 64).

In the museum, when the available cavities were not sufficient, carving of the rock continued and additional volumes were created for new functions such as artifact storage, offices and a restaurant (see Figure 3.21). Another application area of the carving process is the chambers containing the display cases. In order to obtain these chambers, new, smaller-scale cavities were created on the walls forming the cavernous volume. An interesting feature of this building in the context of stereotomy, is that the stones resulting from the carving processes are re-used by being stacked again, to direct museum circulation, provide light control, create defined courtyards outside and shape the landscape. In addition, the stone has found another use by being transformed into dust, and mixed into the mortar of mosaic flooring. Therefore, it should be emphasized that the carving and piling in the Rock Museum follow each other and become a series of sequential processes (Dostoğlu, 2023, 64).



Figure 3.21: Rock Museum at the Cappadocia Region Museum (Yalın Architecture archive).

Intertwining of different stereotomic operations also applies to the visitor center. As stated before, the building is partially buried and blends with the surrounding landscape. Of course, material selection and construction system strengthen the blending between the visitor center and the site. During the construction, the area was carved out to form a second quarry, similar to the one inside the rock, and the visitor center was built on site with tuff stone blocks extracted from this quarry. First carving, then piling up, the building activity occurs one after the other in the visitor center, as in the Rock Museum (Dostoğlu, 2023, 64).

In fact, although there are examples of masonry buildings built with this type of stone in the region (dating back to about 200 years ago), this habit of building has disappeared over time. Therefore, it can be said that the visitor center is a new manifestation of an old habit, and in this sense, it is a good local example of re-interpreted stereotomy (Dostoğlu, 2023, 64).

Another particularity of the visitor center is the transposition between construction systems. After the design phase was completed and the construction process started, due to the contractor company's reservations, structural role assigned to the masonry stone construction system and huge tuff blocks was transferred to the reinforced concrete columns hidden inside. So much so that the roof can be carried even without

these stone masses, while also meeting the requirements of the current earthquake regulations. Therefore, it can be said that a stereotomic behavior is transferred to a system consisting of tectonic, linear elements (Dostoğlu, 2023, 64).

The construction of stone masses constitutes another situation that reflects the intricate relationship between design and implementation. During the design phase, the stones that make up the walls were drawn one by one in the digital medium, and the defined stone types were placed on top of each other to form certain patterns, avoiding vertical alignments of the joints. The architectural team wanted to use the proximity of the quarry and the construction site to their advantage and chose a construction system that is reminiscent of cyclopean masonry. Of course, the designed wall patterns were changed during the construction phase, but the determined principles were preserved (Figure 3.22) (Dostoğlu, 2023, 64).



Figure 3.22: Sample wall from the Cappadocia Region Museum construction site, exhibition “cyclopean” features and merged with a reinforceed concrete structural system (Yalın Architecture archive).

The ceiling which rests on the reinforced concrete load-bearing system with tuff stone blocks, reveals the interconnectedness of the construction systems. As a matter of fact, placing a reinforced concrete slab on blocks stacked on top of each other necessitated the correct analysis of the relationship between the two construction systems. Since it

was impossible to pull the formwork between the floor and the wall, the wooden formwork did not continue above the stone wall: The concrete was poured directly onto a membrane layer covering the formwork, and the upper surface of the stone. This way, the reinforced concrete floor is shaped according to the recesses and protrusions on the upper surface of the stone at the points where it contacts the walls (Dostoğlu, 2023, 65).

Finally, like 35 Green Corner Building and Jingdezhen Imperial Kiln Museum, Cappadocia Region Museum stands out as a stereotomic re-interpretation case, merging stereotomic procedures with each other, while also mixing different construction systems. Nevertheless, in order to understand the way the walls of the museum behave, it is necessary to look at them more closely. In case of the Rock Museum, walls follow the same logic as in a natural cavernous space. Carved out of the rock formation, they work as absolute structural elements, unified with the ceiling and the ground. Additional spaces are obtained with additional carvings. However, as explained above, this is not the only wall condition within the rock. Stones already carved, are then re-used as physical and/or visual barriers, depending on the spatial requirements.

In contrast with the Rock Museum, at the visitor center, the walls share the majority of their structural roles with a reinforced concrete skeleton, placed inside. Even so, they preserve their ability to divide the space, physically and visually. It is possible to argue that both in the museum and the visitor center, the wall texture is the main decorative aspect of the design.

4. FINDINGS

This chapter will consist of the findings from the previous chapter. Here, the objective is to concretize the way the wall has been evolved throughout history, and may regain its ontological status with the help of a re-interpreted stereotomy. In order to advance the discussion, the steps of the aforementioned evolution will be reconsidered, and explained on a coordinate system diagram, one by one.

4.1 Coordinate System Diagrams 1 and 2

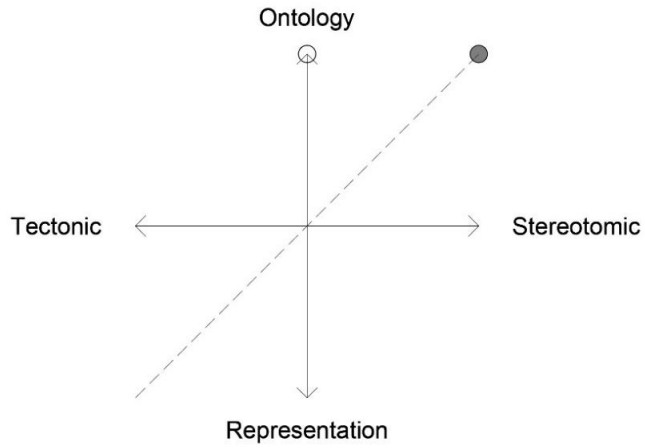


Figure 4.1: Coordinate System Diagram 1.

The first step equated the wall's two contradictory ancestors, the dividing and the load-bearing walls, with the walls of the hut and the cave, in a respective way. These two archetypal spaces, in which humans have been resided for thousands of years, gave us the opportunity to start the analysis, with the help of two contradictory cases. These two cases can be read through two distinct (and rather different) coordinate systems, as will be shown below.

In the first one, we saw how walls belonging to “the stereotomic pole” behave. Nevertheless, even in a cavernous space, this behavior may not always be consistent, as exemplified with the cases of stalactites and stalagmites, geological, and even column-like formations, acting like a tectonic frame, in contrast with the peripheral walls wrapping the cave.

When we focus on the latter case, we see a wall that possesses both of its ontological qualities: It is both structural and dividing (physically and visually). The location of the point on the coordinate system diagram can be considered as an absolute condition: It is positioned on a virtual diagonal between the “Ontology” and “Stereotomic” ends.

As explained above, limiting our findings with the peripheral walls would not allow to understand the walls of a cavernous space. In contrast with those, stalactites and stalagmites can be said to behave in a tectonic manner, even though they are formed with the piling, accumulation of earth strata. Therefore, the point is positioned along the vertical axis, towards the “Ontology” end. Behaving like columns, these geological formations do not block the view, nor the passage. However, their representational qualities are directly tied to their structural logics, strengthening their ontological status.

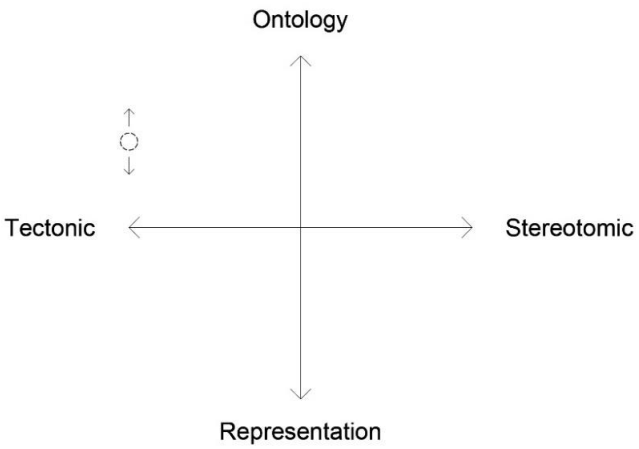


Figure 4.2: Coordinate System Diagram 2.

In the case of the hut, the coordinate system diagram shows a different reality. Here, the walls, made out of skin, textile, leaves, and the like, transferred their structural role

to the vertical or diagonal poles, working like a tectonic frame. Therefore, the point is positioned on the “Tectonic” side of the diagram. Moreover, their ability to divide (both physically and visually) is contingent and changeable. They behave according to the thickness of the material, and the interventions from inside or outside, either by the residents themselves or external conditions such as the wind. Therefore, it is possible to imagine that the location of the point would not be fixed, but rather dynamic. Even so, it is important to clarify that the forming of the hut is tightly related to the positioning of the structural poles, allowing us to keep the point towards the ontological side of the coordinate system diagram.

4.2 Coordinate System Diagram 3

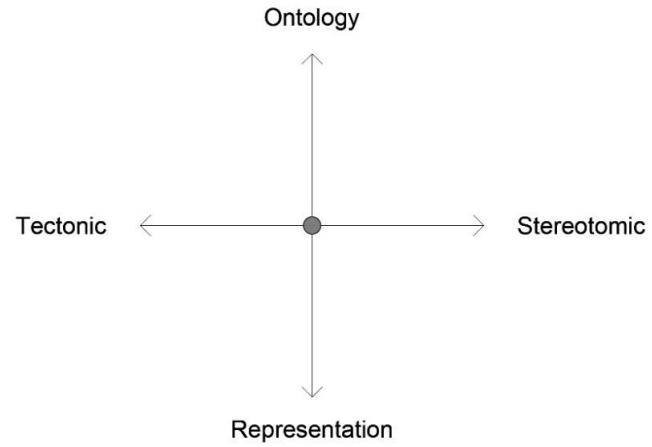


Figure 4.3: Coordinate System Diagram 3.

At first sight, the walls of a classical Greek temple, the Parthenon at the Athens’ Acropolis, can be considered as definite structural and dividing elements. Nevertheless, as shown in the previous chapter, without looking at them from a closer distance, and certainly, through the lens of the theory of architectural tectonics, it is not possible to understand their tectonic and/or stereotomic behaviors, nor to draw their coordinate system diagram…

At Parthenon, the walls and the columns are both part of the structural system, working in cooperation. It is even possible to say that, here, each piece of stone is load-bearing.

Also, the walls divide the interior and exterior spaces, and work as a visual barrier that hide the sacred items from the unwanted eyes. However, in spite of the certainty of their load-bearing and division, it is not easy to position the point on the coordinate system diagram.

Firstly, let's look at the X axis, lengthening between the "Tectonic" and "Stereotomic" ends. Parthenon is right at the intersection of tectonic and stereotomic behaviors. The columns provide an exoskeletal, tectonic frame, surrounding the massive, stereotomic core. The two fundamental construction systems work together for carrying the roof. Moreover, besides their tectonic characteristic, the columns of the Parthenon are constructed in a stereotomic way, to be more precise, by piling, juxtaposing slices of stone.

This ambiguity continues on the Y axis, as well. Here, although built with stone, in a stereotomic way, columns and lintels refer to a tectonic timber construction. Because of the transposition between materials and construction systems, it is not possible to attribute the walls of the Parthenon, a rather ontological quality. Here, there is a disjunction between the way these elements are shaped and constructed. Nevertheless, the forms of the Doric columns, along with their capitals and drums, still reflect the transfer of the loads. Therefore, we can't talk about a solely representational behavior, but rather an ambiguous situation where "Ontology" and "Representation" are both attracting the point towards themselves.

Finally, the point can be placed at the intersection of both axes, at the center of the coordinate system diagram. Here, the walls are somewhere in-between, open for different readings.

4.3 Coordinate System Diagram 4

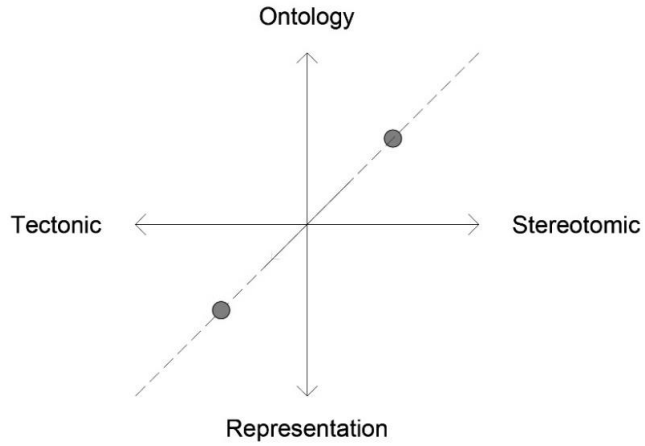


Figure 4.4: Coordinate System Diagram 4.

As explained in the previous chapter, Palazzo Rucellai provides a good basis for continuing the argumentation on the intricate relationship between the column and the wall, that was also among the main topics of the first two phases. Moreover, despite the massiveness and stability of its look (mostly due to the rustication of the stones), the palace's famous and recognizable facade wall can be considered as a dynamic surface, where the issues of ontology and representation are in constant motion. The dynamism in question can also be reflected on the coordinate system diagram 4, as will be seen below.

In parallel with his theory, in Alberti's architecture, the column and the wall are working in coordination, as integrated parts of a unified structural system. The emphasis given to the columns can easily be mistaken for a case where the walls are just infill, without any structural role. However, Palazzo Rucellai's facade wall is a definite structural entity.

Even so, it is necessary to clarify that the said structural capacity decreases from bottom to top, in parallel with the enlargement of the openings, which also results in the decrease of the wall's ability to work as a visual barrier.

Moreover, Alberti's use of the Doric, Ionic and Corinthian orders from bottom to top, in a respective way, can be said to define a certain representational quality that varies along the facade: From a "simpler" base towards a "sophisticated" crown.

It is possible to draw the coordinate system diagram of Palazzo Rucellai's facade wall, as a surface where the location of the point is unstable, reflecting the wall's dynamic character. The point moves from a position where it is more stereotomic and ontologically strong (working as a structural and dividing entity), towards a second position where it is more tectonic and representational, becoming less structural and more open, while also gaining representational qualities, as can be explained in reference with the architect's use of the Corinthian order on the upper floor.

Finally, the palace's coordinate system diagram stands out as a dynamic drawing, such was the case for the hut. Nevertheless, this time, the movement of the point is more drastic; since, it changes its region in a diagonal way, crossing the axes, in contrast with the former case, where it stays at the intersection of the axes.

4.4 Coordinate System Diagram 5

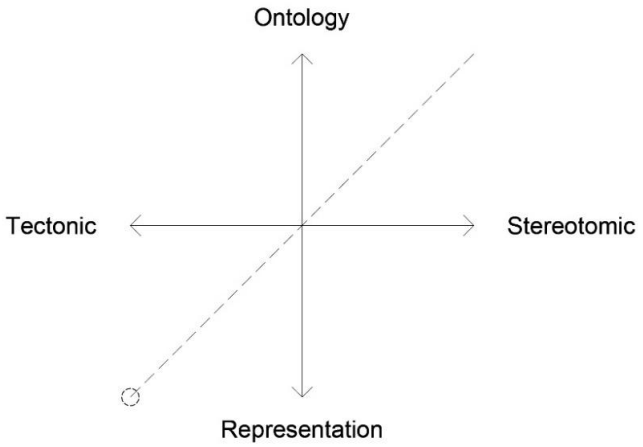


Figure 4.5: Coordinate System Diagram 5.

It is necessary to state that drawing a coordinate system diagram for the Modern House is not an easy job. As explained above, even for an exceptional case such as Farnsworth

House, where facade wall seems to disappear from the architectural scene, its load-bearing and dividing capacities remain, but to some extent.

Let's first look from a structural perspective: At Farnsworth House, the facade wall seemingly transfers its load-bearing capacity to steel columns, which also attempt at hiding their role, with the help of a plug-welding process. Contrary to this perception, both the peripheral wall and the columns are more or less structural. Vertical steel mullions dividing the glazed facade participate at the building's structural logic, as tensile elements, extending from the ground to the ceiling.

The uncertainty around the structural capacity of the wall also continues around its ability to work as a dividing element. Even though it looks completely transparent and thus, permeable, the architect's design choices force us to question our perception: The steel stoppers around the glazing help to strengthen the existence of the facade wall, which becomes even more concretized with the help of the reflected vegetation surrounding the house. Therefore, although it works perfectly as a physical barrier, the visual permeability is not that certain.

Since I described the walls of the Farnsworth House in terms of their functioning as load-bearing and/or dividing elements, I can now describe the formation of the house's coordinate system diagram. It is certain that, despite their partial structural roles, as well as their ability to gain a kind of "opacity", due to the reflection on the glazing and steel components, the location of the point belonging to the walls of the Farnsworth House has to be placed within the "Representation" region. Eventually, it is necessary to accept that here, the columns are the main elements that carry both the ceiling and the elevated ground. As for the ability to divide, the walls are somewhere in-between… A clear physical barrier (considering the limited number of operable windows and doors) perhaps, but an unclear visual barrier, depending on the light, both inside and outside. Therefore, it is not possible to talk about the wall's ontology, which lost almost all of its ontological functions.

It is certain that here, the walls' representational qualities are intentionally avoided. However, we must admit that their absence is a design choice. In fact, it is the most recognized characteristic of this famous house, which can easily be described as Mies's version of the glass house, a certain residential typology in Modern Architecture.

Finally, it is necessary to underline that the walls of the Farnsworth House are tectonic entities, by definition. It is obvious that they make part of a tectonic system, composed of filigree elements, and not carved or piled entities. Therefore, the point, which was already positioned within the "Representation" region, is also pulled towards the "Tectonic" axis's extremity. In the previous diagram, we had seen a case where the point was moving diagonally, on the bisector between "Tectonic" and "Representation". This time, its location is fixed. Nevertheless, it is possible to represent it as a circle drawn with a hidden line. This way, it is possible to express the intentional absence assigned to the wall. The point disappears and re-appears, depending on our reading of the diagram.

4.5 Coordinate System Diagram 6

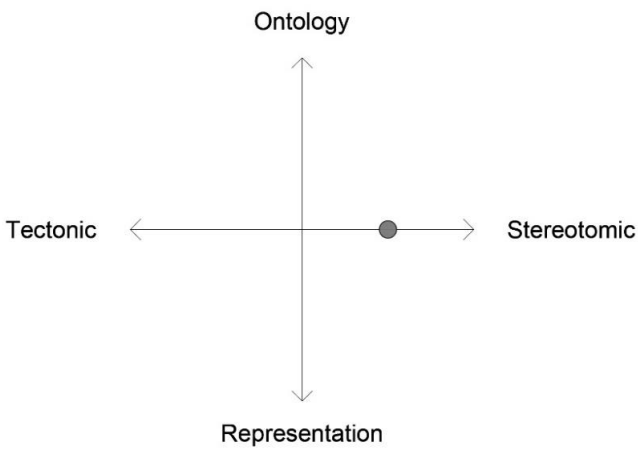


Figure 4.6: Coordinate System Diagram 6.

Following the coordinate system diagram drawn for the Modern House, I will focus on a stereotomic re-interpretation case. As can be seen from the last two diagrams, the Modern House fixated the mobile point of the Renaissance Palace, which was moving diagonally, from the sector between Stereotomy and Ontology, crossing the center of the two axes, and reaching the sector between Tectonics and Representation, in this last position.

With Modern Architecture, the wall left its ontological role as a load-bearing and dividing architectural element behind, only to represent, to signify. Especially in a glass house project like our example, it disappeared from the architectural scene, even if its absence meant something. Nevertheless, as will be shown below, stereotomic re-interpretation has the potential to reclaim this archetypal element within contemporary architectural theory and practice.

In the last part of the previous chapter, 35 Green Corner Building's walls, along with the ones belonging to Jingdezhen Imperial Kiln Museum and Cappadocia Region Museum, were analyzed in terms of their functions, as literal structural and dividing entities.

By using a material which dominated Modern Architecture and which is traditionally used to form a tectonic frame, in a stereotomic way, in other words, by re-interpreting stereotomy, Studio Anne Holtrop managed to re-introduce the wall as an ontological entity, to the architectural space. The wall, unified once again, in opposition to the previous case where its structural capacity is transferred to the columns and its ability to divide, to the phenomena of reflection, and to the textile curtain used inside, is now both load-bearing and dividing.

Nevertheless, as shown in the previous chapter, to contend with an emphasis on the walls' ontology would not be enough to draw the coordinate system diagram. As explained in the last part of the previous chapter, the peripheral walls of 35 Green Corner Building exhibit their stereotomic characteristics, with the help of their decorative aspects, to be more specific, their texture and mouldings.

Therefore, it is possible to claim that the building in question manages to balance its walls' ontological and representational aspects, and the point referring to the peripheral walls of 35 Green Corner Building can be positioned on the line between Ontology and Representation. Nevertheless, contrary to the Parthenon, combining the two stereotomic procedures, which were defined at the beginning of this study as stacking and carving, 35 Green Corner Building is primarily a stereotomic building, even though it re-interprets this ancient construction system by using a relatively recent building material which traditionally belongs to the tectonic domain, along with a contemporary construction method.

Finally, the point which was positioned on the axis between Tectonic and Stereotomic, can now be pulled towards the latter, in accordance with the analysis on top. The wall, which had become a “blinking” point in the sector between Tectonic and Representation, reflecting its intentional (and occasional) disappearance from the architectural scene, is back in the architectural repertoire, ready to be used in many different ways, both in theory and practice, which will be explained in the next, and final chapter.

5. CONCLUSION

It is possible to consider this chapter as the culmination of the discussion led throughout this dissertation. It is here that re-interpreted stereotomy's potential as an alternative way to counter the wall's ontological crisis, which was defined as this fundamental architectural element's ontological loss, will be investigated.

First, I will refer to the findings from the previous chapter. With the help of the coordinate system diagrams in succession, it is possible to read the evolutionary development of the wall (see Figure 5.1). An evolution which can be summarized as such: A bifurcated origin showing a clear division between the tectonics of the frame and the stereotomics of the earthwork, followed by a merging of/balance between the two construction systems and the wall's ontological and representational features, the disruption of the balance between the systems and the features with tectonic gaining weight, ending up in the near dissolution of the wall as an architectural element, and finally, return of the wall in the architectural practice with stereotomy's re-emergence.

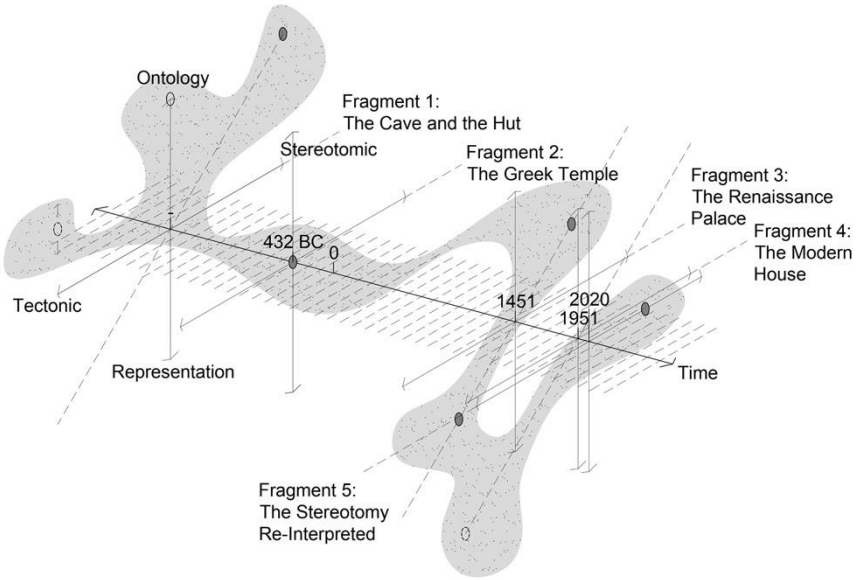


Figure 5.1: Wall's Tectonic Evolution on a Time Series Graph.

To be more precise, the first two coordinate system diagrams dedicated to two ancestral wall cases, the cave and the hut, show that the tectonic/stereotomic division started at the very beginning of the use of the wall as an architectural element. In accordance with Gottfried Semper's clear distinction between two types of wall, the cave and the hut can be said to form the basis of our understanding of stereotomic and tectonic walls.

At the Greek Temple, the bifurcation between the two archetypal cases comes to an end, since the temple's wall unifies the tectonic and stereotomic features in its own entity. At Parthenon, not only the two construction systems work in collaboration, but also the wall's ontological and representational qualities become part of a unified system. This way, the wall's tectonic evolution comes to balance.

The Renaissance Palace exhibits a different character. Indeed, we can observe different features on different Renaissance palaces. Nevertheless, even on a case designed by Leon Battista Alberti, renowned for his so-called "wall architecture", contrasting with Filippo Brunelleschi's architecture where the column can be said to be at the forefront, we can see that the balance in question starts to be disrupted in favor of the tectonic and the representational. The wall starts to transfer its structural capacity to fortified zones on its surface, attached columns in that case, and its degree to divide decreases accordingly.

At the Modern House, the disjunction between the wall and the column looks almost absolute. The wall is no longer a load-bearing element, whereas the column takes full responsibility. Moreover, besides its structural role, the wall's role to divide (at least in terms of visual division) is totally transferred to an additional layer, silk curtains in this case. Isolated from its ontological features, at Farnsworth House, the wall's existence becomes questionable. In fact, its absence caused by its redundancy, can be said to be one of the most important features of Mies van der Rohe's design. The disappearance from the architectural scene represents an important paradigm shift in the wall's history of tectonic evolution, described in this study as its ontological crisis, resulting in this archetypal architectural element's departure from architectural practices' design repertoire.

Finally, re-interpreted stereotomy emerges as a way to bring the wall back in the architectural scene. 35 Green Corner Building refers to this ancient construction

system and re-unifies the Modern Architecture's disintegrated and even disappeared wall. The wall, structural and dividing, load-bearing and isolating becomes once again one of the fundamental elements of architecture. The balance between the tectonics of the frame and the stereotomics of the earthwork is reformulated, with the help of contemporary stereotomy.

As explained at the beginning of the 3rd chapter, changes in the wall's tectonic behavior cannot (and should not) be fully represented, only with the six cases analyzed above, even though these coincide with radical shifts in this element's tectonic evolution. Therefore, on the time series graph, the wall's tectonic evolution is not represented with a continuous line, but rather with a point cloud. This way, it is aimed to express that the wall's tectonic evolution is not a "sharp-edged" process. However, despite the vagueness of the cloud, the graph shows a certainty: The evolution in question comes to a point where the wall, becoming fully tectonic, loses its ontology, and keeps only its ability to represent, whereas the re-emergence of stereotomy might help to re-establish the balance between this element's ontology and representation.

Until now, I tried to interpret the wall's tectonic evolution, based on my findings from the previous chapter, which were visualized with the help of coordinate system diagrams, along with a time series graph. This reading led me to a point where I can propose contemporary stereotomy as a way to counter the wall's ontological crisis. However, as mentioned in the introduction, the objective of this study is not to suggest a contemporary stereotomic design guideline for walls; but rather, to establish a theoretical background which will support current stereotomic approaches re-interpreting the wall as a fundamental architectural element.

In order to do that, this dissertation positions itself within the historical but still viable tectonic discourse, and considers contemporary stereotomic re-interpretations as part of the current tendency to return to the "geological". From this position, it aims at contextualizing the way the wall's ontology, subordinated to its representational qualities, can be recovered once again, with the help of a new, re-interpreted stereotomic approach.

In the second chapter, the wall's crisis was defined as the disruption of the balance between the ontological essence of this archetypal architectural element and its representational qualities. As can be understood from its evolutionary development,

today, wall's ontology became mostly subordinated to its representation, and a re-interpreted stereotomy has the potential to establish it as a fundamental architectural element once again. Losing its structural and material essence especially after the nineteenth century, and certainly as a result of Modern Architecture's efforts, wall became redundant. In a way, its evolution led to its dissolution. Its absence operated as a design choice, its existence kept its meaning only as a feature of representation.

Therefore, the main question to be asked is "how" re-interpretation of stereotomy can be a solution to counter the wall's ontological crisis. Today, conceiving of a stereotomic wall, actually means to turn the tide of this element's evolution, which was outlined in the previous chapter as an irrepressible process of tectonization. In fact, in parallel with the gradual rise of the tectonic, the reciprocal relationship between the wall's ontology and representation has been broken. Therefore, "defending" a stereotomic position can help reclaim this relationship.

It is not possible to separate the appearance of a stereotomic wall, from its structural, material essence. According to Francesco Defilippis, in stereotomy, "the task of representing the figurative and expressive values of architectonic form is entrusted directly to the structure", which, therefore, "has a double role: fulfilling a static function and defining an aesthetic character" (Defilippis, 2000, 951). In parallel with Defilippis's statement, it is possible to say that in stereotomy, ontology and representation are like the two faces of the same coin. In other words, what is ontological, is at the same time representational and therefore, nothing is redundant: Everything is included in the tectonic whole.

Eventually, by merging these two sides, stereotomy opposes the current threads in contemporary architectural discourse, which are leading towards the wall's disintegration and commodification. Nevertheless, before detailing this last statement, it is necessary to detail the argument on the wall's ontological recovery. As Defilippis emphasizes, even though structure has two roles (static and aesthetic) in stereotomy, this does not mean that it has to be conceived of, in an "expressive" way (Defilippis, 2000, 951). Merging of ontology and representation are not necessarily related to the way the structure is "designed" and "aestheticized", but rather to its translation as a representational quality, and the medium of this translation, is "decoration" (Defilippis, 2000, 952).

In order to understand how stereotomic wall's ontology is translated into its representation, the ways stereotomic decoration works has to be understood. First of all, as Defilippis states, analogy (along with metaphor) is an important tool of the decoration; and in fact, the aforementioned translation (from ontological to representational) is based on "the application of analogy to construction", "that is, the construction system is represented analogously by decoration, which formally defines its elements" (Defilippis, 2000, 952). According to Quatremère de Quincy, the Greek temple is an ideal example showing the analogous relationship between the construction system and the decoration: "Indeed, there is no architecture, the imitative and decorative system of which is more visibly imprinted with the primitive nature of things than Greek architecture" (as cited in Defilippis, 2000). It is no surprise than, to position the point representing the wall's tectonic behavior at the Greek Temple, at the center of the coordinate system diagram juxtaposing the axes between stereotomic/tectonic and ontology/representation.

In that case, it is possible to state that in stereotomy, structural and material essence are connected to representation, through the decoration which analogously reflects the construction system. Nevertheless, as Defilippis states, for the establishment of that relationship, legibility of the material is very critical; since, it is by seeing, appreciating the way the blocks have been assembled to form the wall, or in contrast, the way the wall has been carved in such a way to take its final shape, that the reciprocity between its ontological essence and representational character, can be assessed. Stereotomic decoration in question should not cover the ontological essence, which is reduced to a distinct structural, material feature, hidden behind; but rather, must be borne out of it.

According to Defilippis, in stereotomic architecture, there are two methods that decoration can use, while translating ontological essence into representational character: Texture and mouldings. While texture is related to surface qualities, the mouldings address substantial, material qualities. In other words, while the former emphasizes the planar, the latter focuses on the depth.

Indeed, texture's relationship with stereotomy is an interesting subject, especially considering the former's place in Gottfried Semper's theory of tectonics. Nevertheless, before going into the details of this, it is necessary to explain how, as a method of decoration, texture translates the wall's ontological essence into a representational quality. In fact, what is meant with texture in the context of a stereotomic wall, refers

to the way the blocks have been arranged. At the beginning of this chapter, while relating the "return" to stereotomy to a general cultural paradigm shift in architecture, consisting of an interest in the "geological", I had already mentioned stereotomic walls' references to natural, geological formations. It is the texture which shows the way these inspirations are reflected on the surface of the wall. For instance, Defilippis suggests that "assemblage in horizontal layers [where rows of blocks are stacked on top of each other, in parallel with the ground], reproducing the geological principle of stratification and complying with the principles of gravity, may be considered 'natural'" (Defilippis, 2000, 954). However, this does not mean that other sorts of assemblages, where verticality is emphasized, are not natural, but rather that they follow different geological logics.

Indeed, for the ontological essence of the stereotomic wall to be translated into a representational quality, these natural, geological principles which instruct the way the blocks are arranged -in such a way to form a texture- have to be visible. Nevertheless, the degree of legibility is not a fixed value, and can change according to the design intentions. There can be realizations where the transfer in question is more or less apparent (Defilippis, 2000, 955).

Besides texture, the second way to apply the decoration on a stereotomic wall is through the mouldings. This time, the emphasis is not on the surface, but rather on the thickness of the wall. Indeed, in order for the thickness to join the equation, the wall's essence, lying behind the surface, has to be uncovered. Therefore, in contrast with the texture -which is based on the idea of piling up of materials in such a way to create surface patterns- the decoration has to follow another geological logic: carving. What is critical with mouldings, is that they belong to the wall mass, and cannot be considered as external elements added on it afterwards (Defilippis, 2000, 956).

However, even though they are an integral part of the wall, depending on their relationship with its "geometric configuration", its assemblage and its texture, it is possible to split mouldings into two categories, as explains Defilippis. While in the first case, the mouldings are in coordination with the aforementioned features, "in the second case [they] are conceived as an autonomous design, independent of the geometric-constructional and figurative matrix, which consequently 'disappears' behind it" (Defilippis, 2000, 957). Nevertheless, although it is possible to talk about a "disappearance", the second case reminds Semper's conceptualization of the mask,

where what is behind maintains its truthfulness. In fact, considering their inevitably integral character, decoration's ability to translate the ontological to the representational persists even with "independent" mouldings.

Indeed, the emphasis on integrality is very critical, and actually, it is not limited with the mouldings through which the decoration is applied on the wall. In fact, it is possible to state that it is the integrality between different functions of the wall which supports the reciprocity between its ontology and representation. With the help of contemporary digital modelling and fabrication technologies, along with scanning procedures, it is possible to integrate structural, mechanical aspects with the formal decisions, and test their correlation during both conception and construction phases.

Actually, re-integrating the wall with the help of digitalization provides a genuine way to look at this architectural element, contrasting the contemporary thread defined in the second chapter as "layering", which was explained as a process of "disintegration", where wall's each function was attributed to a different layer belonging to the wall assemblage. Instead of conceiving of the wall as the superposition of various layers, where each layer undertakes a different function, stereotomic wall resolves each of these functions, within the thickness, the section of the wall. Consequently, in opposition to Adrian Forty's signifying surface, "freed" from its structural, material or isolation related "burdens", it takes full responsibility for all the expectations from a wall.

Finally, the answer to the question asked at the beginning -"how" the re-interpretation of stereotomy can counter the wall's ontological crisis- starts to become concretized: stereotomic wall's ontology is translated into a representational quality through the decoration, which analogously reflects the wall's structural principles, with the help of the surface texture and the mouldings. In this manner, the relationship between the wall's ontology and representation, which was disrupted as a result of its evolution, especially after the 19th century and under the influence of Modern Architecture, can be re-established. This way, the wall, dissolved as an ontological entity, even "died" as Adrian Forty states in reference to Viollet-le-Duc (Forty, 2013, 13), can be reclaimed as a fundamental architectural element, once again.

It is possible to state that today, stereotomy can be considered as a way to counter the wall's ontological crisis. Contemporary stereotomic wall applications, with different

textures and mouldings resulting in various forms of decoration, experiment with this old but fundamental element of architecture, which was destined to disappear. Although in different ways, they attempt to translate the ontological essence of the wall they address, into representational qualities which support and enrich their architecture(s).

As mentioned previously, the objective of this dissertation is not to propose a stereotomic design guideline. Nevertheless, it is hoped that, by attempting to fill the theoretical gap between the tectonic discourse and current stereotomic realizations, it may help reclaim both stereotomy as an old but persistent way of thinking and producing architecture, as well as the wall as an architectural element, while also strengthening the intellectual position of current stereotomic realizations and providing a contemporary discussion ground for the tectonic discourse.

In accordance with the wider cultural tendency towards the geological, stereotomic wall stands between the natural and the artificial. It formulates itself in reference to nature and geology, while connecting back to them. It resists the dynamics of the contemporary daily life with its durable and solid nature; but adapts to it (when necessary) with its ability to be reused in different layouts. It avoids excess, by optimizing what is at hand, in its own substance. Finally, it gives back the wall its structural, material essence, its ontology, and strengthens its position in the face of the current process of "tectonization", eventually accompanied by an unsparing commodification.

Before concluding the study, I would like to talk about a subject that caught my attention while I was describing the wall, but that I had not focused on until now, thinking that it would be useful to detail it in the conclusion. I believe that this part will connect the beginning and the end of the thesis, and while it may open the door for different theoretical discussions, it will also enable to establish consistency within this study.

While explaining the objectives of the thesis, I expressed the importance of bringing stereotomy and the wall back into contemporary architectural practice and providing a theoretical basis for existing stereotomic experiments. However, at this point, I think it is necessary to question once again what brings together stereotomy as a construction method and the wall as a building component. As a matter of fact, there must be a

reason why the wall is the focus of a study, investigating the potentials of stereotomic construction system within the framework of the theory of architectural tectonics.

I think the answer to this question has to do with the essence of the wall as a building component. The wall is a balancing element among other components: Simply put, it transfers the loads it receives from the roof to the foundation. Moreover, while it establishes the balance between the top and the bottom, it also tries to stay in balance itself. While vertical loads move along its body, horizontal loads try to tip it sideways. It expands when necessary and narrows when not. In the case of columns adjoining its surface, it achieves a rhythm. The gaps opened on its surface, making it physically or visually permeable, are passed through beams or arches and begin to decorate the wall.

From this perspective, balance is not only established between the roof and the floor, but also between horizontal forces and the width of the wall. The wall also establishes a balance between its load-bearing capacity and its permeability. The fact that the elements that make the wall load-bearing or permeable also determine its shape and become part of the decoration, adding another kind of balance, this time, between the wall's functions and form. Considering all these, it is possible to talk about a multi-layered balance situation.

At the beginning of the study, I tried to explain that tectonics is the knowledge of building, based on the balance between structure and appearance, and from another perspective, between necessity and freedom. It should not be surprising, then, that the wall, as the founding component of a multi-layered balance, was placed at the center of a study in the context of tectonics, which is itself a search for balance. And how does the stereotomic construction system complete the tectonic theory and wall component? It is possible to explain this, based on the fact that the balance established by the wall can be translated through stereotomic decoration. As a matter of fact, stereotomy concretizes the balance established by the wall by making it visible.

In conclusion, I can say that there is a spontaneous, “natural” connection between the theory of architectural tectonics, stereotomic construction and the wall as a building component. In other words, if I am discussing how the stereotomic construction can trigger the reintroduction of the wall into current architectural practice, in the context of tectonic theory, this is partly because it should be so. If I were to go a little further,

even though I, as the author, determined the context and focus of the thesis myself, I could claim that this coexistence is not accidental and that it is even inevitable.

I think that this inevitable coexistence, which I was not aware of at the beginning, became aware of while writing, and ultimately wanted to detail, is important for the theoretical integrity of the thesis. So much so that, at this stage, when asked why tectonics, stereotomy, or walls establish the topic of this study, I cannot give an answer without mentioning all three of them. I hope that this theoretical integrity will open the door for other discussions, with the help of the trilogy in question. I believe that within the framework of the theory of architectural tectonics, and through the stereotomic construction system and wall component relationship, regardless of where the emphasis is, building readings can be made and different fields within architectural theory can be touched upon.

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- 2015-2016 Lecturer at Istanbul Bilgi University, Faculty of Architecture, Department of Interior Design, Interior Design Studio
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